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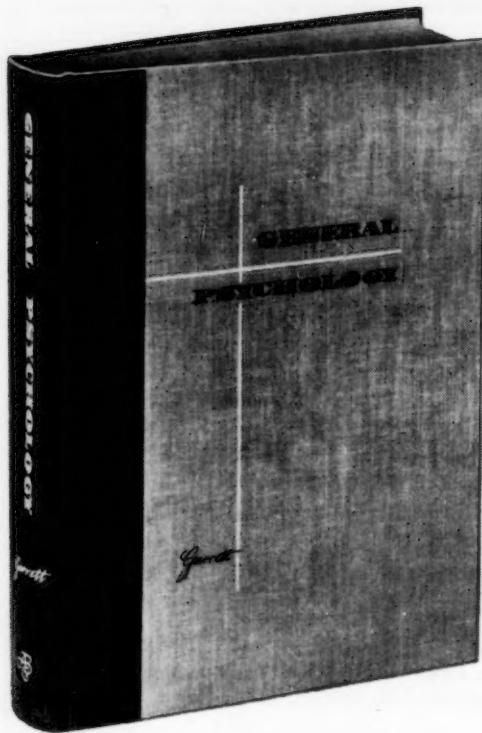
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GENERAL ANNOUNCEMENTS

All program participants who plan to use audio-visual aids (projectors, etc.), even though they have included this information with material submitted for the program, are urged to write to Paul R. Wendt, 241 Molimo Drive, San Francisco 27, describing the precise needs for equipment, including slide sizes. Dr. Wendt will then be able to be sure that the equipment is available at the proper time and place.

Time and Place: Thursday, September 1 through Wednesday, September 7, 1955, in San Francisco, California. San Francisco is on Pacific Daylight Saving Time. Three hotels have been designated as Joint Headquarters: The Sheraton Palace Hotel, Market and New Montgomery Streets; The St. Francis Hotel, Powell Street at Union Square; and the Sir Francis Drake Hotel, Powell and Sutter Streets. These hotels are located within ten minutes' walking distance of each other in downtown San Francisco. A few meetings will also be located in the University of California Extension Division in San Francisco.

Reservations: Room reservations should be secured through the APA Housing Bureau, c/o The San Francisco Convention and Visitors Bureau, Room 300, 61 Grove Street, San Francisco 2, California. A list of hotels and their prices and a reservation blank appeared in the April *American Psychologist*. Reservations should be requested as soon as possible because San Francisco hotels tend to be filled the first of September.

Registration: Members are urged to register in advance. (See advance registration form in April *American Psychologist*.) Those who have registered in advance should go to the Advance Registration Desk in the Sheraton Palace Hotel. Convention Registration Desks for those who have not pre-registered will be located in the Sheraton Palace, Sir Francis Drake, and the St. Francis Hotels. The registration fee for nonmembers of the APA is \$2.50.

Mail and Directory: A directory of registrants and facilities for messages and mail will be maintained on the lobby floor of the Sheraton Palace Hotel near the Registration Desk.

Tickets for Luncheons and Dinners: It is necessary to purchase tickets for all scheduled luncheons and dinners. Tickets will be sold at a Special Events Desk on the lobby floor of the Sheraton Palace Hotel. Luncheon tickets must be purchased before 10:00 A.M. and dinner tickets before 3:00 P.M. on the day the event is scheduled.

Information Desks: General information about the Convention and about San Francisco can be obtained at the Information Desks located on the lobby floor of the Sheraton Palace Hotel, on the mezzanine floor of the St. Francis Hotel, and on the mezzanine floor of the Sir Francis Drake Hotel.

Exhibits: Exhibits of books, apparatus, tests, and other psychological material will be located in the Rose Room on the lobby floor of the Sheraton Palace Hotel.

Placement: The Placement Office will be located in the French Parlor of the Sheraton Palace Hotel. With the exception of APA Day when the office will be closed, the Placement Office will be open from 9:00 A.M. to 5:00 P.M. daily throughout the meeting.

Location of Various Headquarters:

Convention Headquarters: Room 2018, Sheraton Palace.
APA Central Office: Room 2006, Sheraton Palace.
APA Placement Office: French Parlor, Sheraton Palace.
Public Relations: Room B, Sheraton Palace.
VA Headquarters: Rooms 214 and 217, St. Francis.
U. S. Public Health Service: Room 2020, Sheraton Palace.

Some divisions and other organizations plan to maintain Headquarters Rooms. For their locations inquire at the Information Desks.

Meeting Room Locations:

Sheraton Palace Hotel
California Room, 2nd Floor
Comstock Room, 2nd Floor

Concert Room, Lobby Floor
English Room, 2nd Floor
French Parlor, 2nd Floor
Ballroom, Lobby Floor
Room A, Lobby Floor
Room B, Lobby Floor
Rose Room, Lobby Floor
Rooms 2000-2131, 2nd Floor

Sir Francis Drake
Empire Room, 2nd Floor
Franciscan Room, Mezzanine
Monterey Room, 2nd Floor
Parlor B, Mezzanine Floor
Rooms 210-221, 2nd Floor

St. Francis
Borgia Room, Mezzanine Floor
Colonial Room, Mezzanine Floor
Green Room, Mezzanine Floor
Italian Room, Mezzanine Floor
Rooms 200-261, 2nd Floor

Civic Auditorium
Civic Center, Larkin and Grove Streets
University of California Extension Division, 540 Powell
Auditorium, Basement Floor
Lecture Room, 3rd Floor

Convention Personnel: Many people have been working for months in advance and will be working hard during the Convention to attempt to make things run smoothly. The following are those whom you may wish to contact before or during the Convention:

Convention Manager: Brant Clark, San Jose State College.
Convention Program Chairman: George C. Thompson, Syracuse University.
Placement Office: Carl H. Rush, Jr., APA Central Office.
Public Relations: Thomas W. Harrell, Stanford University.
Exhibits: Theodore R. Sarbin, University of California, Berkeley.
Registration: Robert E. Dreher, San Francisco State College.
Special Events: Jay T. Rusmore, San Jose State College.
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Arrangements for APA Day Meal Functions: Alan W. Johnson, San Francisco State College.
Chairman of Committee for Entertainment for APA Day Supper: Harry J. Older, Washington, D. C.

Requests for services of these individuals during the Convention should be made either at the location of their functions or at the Convention Headquarters located on the 2nd Floor, Room 2018 in the Sheraton Palace Hotel.

Condensed Program: The Condensed Program, published as a separate pamphlet, has been mailed to all members of the Association. Copies will also be available at the Convention.

PRE-CONVENTION SESSIONS

MONDAY, AUGUST 29

Board of Directors, APA. 9:00 A.M.-5:00 P.M.
Room 2002, Sheraton Palace.
Board of Directors, APA. 7:30-11:00 P.M. Room
2002, Sheraton Palace.

TUESDAY, AUGUST 30

Board of Directors, APA. 9:00 A.M.-5:00 P.M.
Room 2002, Sheraton Palace.
National Foundation for Infantile Paralysis.
Meeting of psychologists and psychiatrists in res-
pirator center programs. 9:00 A.M.-5:00 P.M.
Room 217, St. Francis.
**Meeting of Chief Psychologists in State Mental
Health Programs with Psychologists from the
National Institute of Mental Health.** 9:00 A.M.-
5:00 P.M. San Francisco City and County Health
Department, 101 Grove Street. ERNESTINE B.
BOWEN AND PAUL PENNINGROTH; Co-Chairmen.
ERNESTINE B. BOWEN AND PAUL PENNINGROTH,
Co-Chairmen

Board of Directors, APA. 7:30-11:00 P.M. Room
2002, Sheraton Palace.

WEDNESDAY, AUGUST 31

Board of Directors, APA. 9:00 A.M.-5:00 P.M.
Room 2002, Sheraton Palace.
National Foundation for Infantile Paralysis.
Meeting of psychologists and psychiatrists in res-

pirator center programs. 9:00 A.M.-5:00 P.M.
Room 217, St. Francis.

**VA Clinical and Counseling Psychology and
Training Universities. General Session.** 9:00
A.M.-12 M. Italian Room, St. Francis.

**Meeting of Chief Psychologists in State Mental
Health Programs with Psychologists from the
National Institute of Mental Health.** 9:00 A.M.-
5:00 P.M. San Francisco City and County Health
Department, 101 Grove Street. ERNESTINE B.
BOWEN AND PAUL PENNINGROTH; Co-Chairmen.

**VA Clinical and Counseling Psychology and
Training Universities.** 2:00-5:00 P.M. Italian
Room, St. Francis.

**VA Clinical and Counseling Psychology and
Training Universities. Social Hour.** 5:00-6:00
P.M. Green Room, St. Francis.

**VA Clinical and Counseling Psychology and
Training Universities. Special Work-Group Con-
ferences on Technical Problems.** 7:30-9:30 P.M.
Italian Room, St. Francis.

Board of Directors, APA. 7:30-11:00 P.M. Room
2002, Sheraton Palace.

Division 16. Old Executive Committee Meeting.
7:30-11:00 P.M. Room 205, Sheraton Palace.

List of APA Divisions

Note.—In this program the APA Divisions are referred to by number rather than by name.
The list below gives the number and name of each division.

1. Division of General Psychology
2. Division on the Teaching of Psychology
3. Division of Experimental Psychology
5. Division on Evaluation and Measurement
7. Division on Developmental Psychology
8. Division of Personality and Social Psychology
9. The Society for the Psychological Study of So-
cial Issues—A Division of the APA
10. Division on Esthetics
12. Division of Clinical Psychology
13. Division of Consulting Psychology
14. Division of Industrial and Business Psychology
15. Division of Educational Psychology
16. Division of School Psychologists
17. Division of Counseling Psychology
18. Division of Psychologists in Public Service
19. Division of Military Psychology
20. Division on Maturity and Old Age

PROGRAM OF THE SIXTY-THIRD ANNUAL CONVENTION OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

SEPTEMBER 1-7, 1955, SAN FRANCISCO, CALIFORNIA

THURSDAY MORNING, SEPTEMBER 1

Division 8. Parent-Child Relationships

8:40-9:40. Empire Room, Sir Francis Drake

URIE BRONFENBRENNER, Chairman

8:40. Some psychological correlates of differential fertility: a longitudinal study. ELLIOT G. MISHLER, CHARLES F. WESTOFF, AND E. LOWELL KELLY, *Princeton University and Office of Population Research, Milbank Fund, and University of Michigan*.

PROBLEM: What are some of the psychological characteristics of either or both the husband and wife which are associated with completed size of family? Although there is considerable interest in the relation of psychological factors to differential fertility, stimulated currently by the increase in the national birth rate over the past 15 years, very little empirical information is available which bears on this problem. In addition, existing studies suffer from the post facto nature of the psychological data, i.e., usually this information is collected after the completion of the fertility cycle, and it has been difficult to determine whether the found relationships existed prior to or developed after the presence of children. The present study avoids this difficulty in that relationships are explored between psychological variables measured prior to marriage and the fertility performance of a couple at the end of 20 years of marriage.

PROCEDURE: Between 1934 and 1937 Professor E. Lowell Kelly interviewed 300 engaged couples in the initial phase of a study of marital adjustment. All but a few of these couples have been recontacted during the past year as part of the follow-up of the study and have reported on the number of children born to their marriage. A large amount of information was gathered during the engagement interview and the present report will examine relationships between fertility and the following variables: desired size of family, attitudes on a number of issues relating to marriage and children, self and friends' ratings on a Trait Rating Scale, and scores on the Allport-Vernon

Study of Values, the Bernreuter Personality Inventory, and the Strong Occupational Interest Inventory. **RESULTS:** In general, the same characteristics which are related to fertility desires are also related to fertility performance and there is a fair amount of similarity between the significantly related characteristics of the husband and of the wife. The pattern of results tends to be internally consistent although the magnitudes of the individual correlations are of the order of .15 to .20. Low fertility tends to be associated with strong orientations toward power and practical success, with marked feelings of inadequacy and over-concern with selves (particularly for women), and with strong drives for autonomy and adventure (particularly for men). Stable and dependable individuals and those with a high energy level tend to have larger families.

The results lend support to the general hypothesis that psychological factors are related to differential fertility. The findings will be discussed with reference to current plans for new studies of social and psychological factors affecting fertility.

8:55. Structure of attitudes toward child-rearing and the family. EARL S. SCHAEFER AND RICHARD Q. BELL, *National Institutes of Health*.

PROBLEM: Personality theory, psychological research, and observations made in psychotherapy with parents of emotionally disturbed children have suggested that certain syndromes of parent behavior are related to personality development of children. Previous studies suggest a need for research on the structure of the pathogenic belief-value matrices or need-dispositions of women which influence their relationships with children. An empirical investigation of the structure of attitudes toward children and the family was undertaken to identify groups of related attitudes which could be used as a basis for further research on environmental influences on personality development. **PROCEDURE:** Twenty-four attitude scales which had been developed to give reliable measures of variables which hypothetically influence family relationships

were administered to 100 young unmarried women. The twenty-four attitude variables were intercorrelated, the correlation matrix was factor analyzed and a simple structure rotation was performed.

RESULTS: Despite homogeneity of the subjects in age, education, socioeconomic level and degree of psychological sophistication, adequate subtest reliabilities were found. Five relatively independent syndromes of attitudes, each defined by several attitude scales, were isolated and were tentatively identified as Over-possessiveness, Excessive Demand for Striving, Harsh Punitive Control, Suppression and Interpersonal Distance, and Hostile Rejection of the Home-making Role.

CONCLUSIONS: Young unmarried women have well-structured attitudes toward child-rearing and the family prior to actually assuming the role of a mother. The attitude syndromes isolated resemble syndromes found by clinicians in studies of parents of emotionally disturbed children. The existence of several relatively independent factors suggests the feasibility of further research to determine the effect of different parental attitude syndromes upon personality development.

9:10. Guilt over anger as predicted from parental discipline: a study of superego development.

WESLEY ALLINSMITH AND THOMAS C. GREENING, *University of Michigan*.

For an understanding of socialization and of individual differences in personality, it is necessary to take superego development into account. This study is one of a series relating child-rearing experiences to subjects' internalized moral needs.

The aspect of superego investigated is the "severity," measured by the amount of guilt that subjects show in connection with the violation of moral norms. The problem of knowing whether a moral standard is internalized was solved by eliminating risk of getting caught in an infraction. Thus signs of disturbance following infraction could be interpreted as guilt reactions rather than as responses to fear of external censure.

The subjects were 236 young adults who took a story-completion test designed to study guilt and answered a questionnaire about the ways they were disciplined by their parents when they were "about age 10 to 12." The independent variable, type of discipline, was categorized into "direct attack" varieties (e.g., spanking) and "psychological" approaches such as reasoning with the child or appealing to his love for the parents through "visible suffering" on the parents' part. Previous work indicates that categorizations of this sort made from subjects' reports

about parental discipline correspond to those derived from interviews with the parents themselves.

The dependent variable in this study was intensity of guilt about aggression. This variable was coded from endings written by the subjects to story-beginnings in which the hero becomes secretly angry at a friendly male authority figure. In accordance with several theoretical considerations and previous research findings, the prediction was that for males high rather than low guilt about anger will be associated with psychological discipline by the mother. This prediction was borne out at the .01 level. Subsidiary findings are discussed including those for women subjects and for discipline by the father.

9:25. Aspects of the self-concept as variables intervening between parental reward and peer status in children. MALCOLM M. HELPER, *University of Illinois*.

PROBLEM: Three aspects of children's self-concepts—two types of "identification" and stability of the ideal self-concept—were studied in relation to (a) indicants of parental reward impinging upon children's self-descriptive behavior; and (b) the children's sociometric status.

METHOD: In 50 families, each spouse used a 42-item adjectival scale to describe himself, his early adolescent child, and his ideal for the child. On the same scale, the child described himself, his like-sexed parent, and his ideal self, repeating the latter rating after one week. All variables, except sociometric status, were assessed by profile comparison of pairs of ratings, using the D^2 statistic. Parental reward of the child for emulating his like-sexed parent was assessed by the similarity between the parent's ideal-child ratings and his ratings of the like-sexed parent. Discrepancy between the rewarding behavior of the two spouses was estimated by the difference between the spouses' ideal-child ratings. One type of identification (self-concept modeling) was estimated by the similarity between the child's self-ratings and his ratings of his like-sexed parent. The other (ideal-self dependency) was estimated by the similarity between the child's ideal-self ratings and the like-sexed parent's ideal-child ratings. The similarity between the child's successive ideal-self ratings gave an estimate of ideal-self stability. Sociometric status was ascertained from choices of work partners.

RESULTS: For boys, parental reward is positively correlated with self-concept modeling ($\rho = .40$, $p = .05$), and with ideal-self dependency ($\rho = .41$, $p = .05$). The discrepancy between spouses' ideal-child concepts is positively correlated with instability of the child's ideal-self concept ($\rho = .34$, $p = .01$, using the total sample). Boys having high sociometric

status show more self-concept modeling and have greater ideal-self stability than low status boys. Sex differences are discussed.

Division 12. Application of Tests I

8:40-9:40. Room A, Sheraton Palace

HARRISON G. GOUGH, Chairman

8:40. A study of psychiatric technicians on selected measures of intelligence and personality. KENWOOD BARTELME AND GORDON L. RILEY, *Napa State Hospital*.

PROBLEM: Psychiatric technician trainees in a state hospital were studied on a number of intellectual and personality variables. It was expected that systematic variations would occur along the measured dimensions with respect to the achievement or nonachievement of a criterion of successful completion of the six-month training program for such personnel.

METHOD: Incoming employees were administered the Minnesota Multiphasic Personality Inventory and the Shipley-Hartford scale. At the end of a twelve-month period, personnel records were scrutinized to form the criterion groups. Eighty subjects were placed in a "success" group (forty males and forty females). These subjects had successfully completed the formal training program and had, in addition, been warmly endorsed by a variety of ward supervisors on a standard rating sheet. Fifty-three subjects formed the "failure" group (twenty-eight females and twenty-five males). These subjects had been discharged from the program during the six-month period because of "unsuitability." The MMPI was scored on the standard validity and clinical scales. In addition, scores were obtained for Social Prejudice, Ego Strength, Responsibility, Dominance, Status and the Welch A and R factor scales.

RESULTS: The data were analyzed in terms of the criterion and also in terms of sex differences. No significant separations occurred on the intellectual variables. Analysis of the personality dimensions indicated that unsuccessful differed from successful trainees in terms of such factors as social rigidity, irresponsibility, impulsivity, and anxiety. These results, however, were somewhat confounded by sex differences. Successful and unsuccessful females showed highly congruent patterns of personality traits. To a somewhat lesser extent, successful males also resembled the female samples. Unsuccessful males, on the other hand, represented a different population, showing a distribution of traits that suggest marked characterological difficulties. Differences and resemblances in the groups are conceptualized and discussed from the standpoint of the nature of the employment.

8:55. Figure drawing norms, reliability, and validity indices for normal late-adolescents. II. Development of a pictorial scale of DAP Quality. MAZIE EARLE WAGNER, *State University of New York College for Teachers, Buffalo, and Herman J. P. SCHUBERT, VA Hospital, Buffalo*.

As part of a larger study to establish figure-drawing norms for normal late adolescents, DAP Quality scales for men and for women for both male and female figures have been developed, including pictorial illustrations and verbal descriptions of the scale points, drawing and rating reliabilities, and relationships to school grades, intelligence, other figure characteristics, indices of adjustment, reading speed and comprehension, drop-out level, and socioeconomic status.

The subjects used were 1,515 late adolescents, 801 males and 714 females made up of 596 noncollege going high school seniors, and 919 college freshmen. The drawings were obtained by standard procedure on an $8\frac{1}{2} \times 11$ page, with care that the one done first be so marked.

Characteristics used in scaling DAP figures include: form quality, lifelikeness, three-dimensionality, and proportion and relation of parts. Drawing reliability of same-sexed figures is between .80 and .85, as is the relation between the quality of the male and female figures. Rater reliability, with the use of the scale and some experience, approaches .90.

DAP Quality relates to grade-point average at .40 or better for a narrowly distributed college population. When used with ACE intelligence, in a multiple R, it improves the ACE prediction of college success. It is especially useful in indicating drop-outs. This predictiveness holds for even the generally higher scaled figure drawings of the Art Education students.

Except for grade-point average, relationships are low or absent, with slight trends in the direction of the better the drawing the higher the MMPI Status and Paranoid scales and the higher the ACE L and Buffalo Reading Comprehension scores. Implications will be discussed.

Slides.

9:10. Predicting intelligence from the Rorschach. PAUL D. GREENBERG, STEWART G. ARMITAGE, AND DAVID PEARL, *VA Hospital, Battle Creek, Michigan*.

PROBLEM: To determine the accuracy with which the level of intellectual functioning of the individual NP hospital patient can be predicted from the Rorschach.

PROCEDURE: Two approaches were made to this problem. The first examined the relationship between Wechsler-Bellevue IQ and various single and com-

posite Rorschach scoring variables. This was an objective, statistical procedure employing chi-square and correlational techniques. The second approach utilized three clinicians, each of whom made two independent estimates of intelligence for each patient, based upon the Rorschach psychogram and the Rorschach protocol, viewed separately.

SUBJECTS: The samples for the two analyses differed. The objective, statistical approach utilized Rorschach records from 503 patients, including 252 unclassified schizophrenics, 103 paranoid schizophrenics, and 148 neurotics. For the judgmental approach, 120 records giving equal representation to the three diagnostic groups were drawn systematically from the larger sample. To avoid spurious accuracy in the judgments, this sample was rectangularly, rather than normally, distributed with respect to IQ.

RESULTS: The attempt to relate, statistically, single or composite Rorschach scoring variables to W-B intelligence failed to yield useful estimates of intelligence. Clinicians, using just the Rorschach psychograms, attained somewhat greater accuracy of prediction. When, however, the clinicians judged the Rorschach protocols, fairly accurate estimates of intellectual functioning were obtained. Differences in accuracy of prediction for the three judges, for the different diagnostic groups, and for different IQ levels, were not significant.

CONCLUSIONS: While Rorschach estimates cannot be substituted for W-B scores, the clinician can make meaningful estimates of intellectual functioning using the Rorschach protocol. The frequency of accurate estimates permits useful prediction on a group, though not individual, basis. This is at a highly significant level and suggests further research along such lines as the identification of factors related to the accurate prediction of intelligence from projective data.

9:25. A comparison of the reliability of interpretations of four psychological tests. KENNETH B. LITTLE, *Stanford University*, AND EDWIN S. SHNEIDMAN, *VA Center, Los Angeles*.

PROBLEM: To compare the reliability of blind interpretations of the Rorschach, Thematic Apperception Test, Make-A-Picture-Story test, and the Minnesota Multiphasic Personality Inventory.

SUBJECTS: Forty-eight skilled clinical psychologists served as judges. Twelve were selected to work with each test. Experience with the tests ranged from 6 to 24 years.

PROCEDURE: Test protocols were secured from 12 white, male, hospitalized veteran subjects between the ages of 22 and 33. Three subjects were psychotic, three were neurotic, three had psycho-physiological

disorders, and three were nonpsychiatric (normal) cases. Each interpreter received four protocols, one from each category of subject type, which he evaluated in a specified order. Ten days after completion of this task the first protocol was returned and the judge repeated his evaluation.

The interpretative task was structured in the following forms: (a) a Q sort of 76 items describing present reaction patterns of the subject, (b) a rating of the degree of maladjustment of the subject, (c) a diagnosis, (d) a set of 117 true-false items representative of the type of statements made in psychological reports, and (e) 100 true-false postdictive factual items. For tasks (d) and (e) the interpreter also indicated his confidence in his answers on a four-point scale.

Comparisons of the reliabilities among the four tests were made for each content area and, for the true-false items, the relationship between the reliability of the judgments and the judges' confidence in them was determined.

RESULTS: The data indicate that there is a significant difference in the reliability of interpretations among the four test types for areas (a), (b), (d), and (e). A significant positive relation was observed between confidence and reliability for the two sets of true-false items.

This study was supported by funds from a Public Health research grant.

Division 16. Symposium: Implementation of the Thayer Conference Report

8:40-12:00. Auditorium, U. of C. Extension Bldg.

GERTRUDE P. DRISCOLL, Chairman

Participants: MAY SEAGOE GOWAN, MARIE SKODAK, AND FRANCES A. MULLEN.

Division 17 and National Council on Psychological Aspects of Disability. Symposium: The Role of the Psychologist in Rehabilitation

8:40-10:40. Concert Room, Sheraton Palace

JOHN G. DARLEY, Chairman

Participants:

PETER J. NAPOLI. A hospital rehabilitation program.

HAROLD CHENVEN. A rehabilitation agency.

WILLIAM GELLMAN. A community rehabilitation service.

ANDREW W. MARRIN. A state rehabilitation program.

Division 8. Symposium: Organization Studies of the Systems Research Laboratory

9:50-11:50. Empire Room, Sir Francis Drake

JOHN L. KENNEDY, Chairman

Participants:

JOHN L. KENNEDY. The Systems Research Laboratory and its program.

ROBERT L. CHAPMAN. Methodology of the Systems Research Laboratory.

ALLEN NEWELL. Experimental design formulations.

MILTON G. WEINER. The organizational model.

WILLIAM C. BIEL. Experimental conditions.

LAWRENCE T. ALEXANDER. Evaluation of training progress in complex systems.

A method is presented for selecting Stanford-Binet Intelligence Scales test items for testing the mental abilities of severely handicapped cerebral palsied children. First the degree of physical handicap is ascertained, using the form, "Survey of Degree of Physical Handicap" (see "A Survey of Degree of Physical Handicap," *Cerebral Palsy Rev.*, 15, 11-12, Nov. 1954). Then a chart is consulted which indicates the physical abilities required to perform each of the test items in the Stanford-Binet Scales, Form L and M. Only the test items which are found to be within the physical limitations of the severely handicapped child should be administered.

Slides.

Division 12. Brain Damage I

9:50-10:50. Room A, Sheraton Palace

OLGA BRIDGMAN, Chairman

9:50. Brain injury at birth (cerebral palsy) and perceptual responses during childhood and adolescence. T. W. RICHARDS AND SARA W. HOOPER, *Louisiana State University*.

Ranging in age from four to nineteen years, thirty-two children and adolescents with well established medical diagnosis of "cerebral palsy" were matched for age, sex, and verbal IQ with a control group. Thus, sixty-four children were studied.

Performance with the Rorschach Test showed that there were significant differences between the brain-injured and control groups, in that the former produced a greater proportion of vague and amorphous whole responses, a large number of the "signs" described as related to brain damage, although fewer total responses.

A significant finding in the study was that a "blind" analysis of the Rorschach records, divided into randomly assorted groups of brain-injured and control adolescents ($N = 24$), grade school children ($N = 22$) and preschool children ($N = 18$) showed that it was not possible to distinguish the "cerebral palsy" adolescents from "normals" on the basis of the Rorschach performance. It was possible to make this discrimination fairly well for preadolescents, and best for the preschool children.

Conclusions from this study deal with the possibility that, with increasing age, "CP" children are more like others.

10:05. A method of selecting Stanford-Binet Intelligence Scale test items for evaluating the mental abilities of severely handicapped cerebral palsied children. ELIAS KATZ, *University of California, School of Medicine, San Francisco*.

10:20. The use of the Bender-Gestalt test in the study of brain damage. JOSEPH C. MARK, *VA Hospital, East Orange, N. J.*, AND ROBERT S. MORROW, *VA Hospital, Bronx, N. Y.*

Seven clinical psychologists representing various levels of training and experience participated in an attempt to differentiate objectively the Bender-Gestalt records of 22 brain-damaged and 22 psychiatric patients. The 44 records were randomly interspersed. Nine scoring criteria had been selected as providing the basis of judgment and these were scored on a three-point scale as to absence or degree present. These criteria were (a) General Impression, (b) Arrangement and Planning, (c) Rotation, (d) Motor Coordination (e) Perseveration, (f) Angles and Curves, (g) Fragmentation, (h) Impotence, (i) Size.

Chi-square comparisons between the brain-damaged and psychiatric groups indicated that the combined total of the nine signs was significantly higher for the brain-damaged group. Six of the nine criteria for brain damage differentiated significantly between both groups at the .01 level or below, these being General Impression, Motor Coordination, Perseveration, Angles and Curves, Fragmentation and Impotence; Rotation was significantly higher for the brain-damaged group at the level below .05. Size deviations were regarded as being greater for the brain-damaged group at the level of significance which approaches .05 (between .10 and .05). The only sign which did not distinguish significantly between the two groups was Arrangement and Planning.

Using the total scores, which combined the scores of the nine criteria, cut-off points were established which differentiated significantly between the brain-damaged and psychiatric patients. The use of this simple, objective scoring system in the clinic and for research will be discussed, especially with respect to the theories of brain functioning.

Slides.

10:35. The performance of brain-damaged patients on the Wechsler Memory Scale. ROBERT S. MORROW, *VA Hospital, Bronx, N. Y.*, AND JOSEPH C. MARK, *VA Hospital, East Orange, N. J.*

This study compares Wechsler Memory Scale performance of 21 brain-damaged patients with a control group of matched psychiatric patients. Autopsies were performed on the brain-damaged group indicating the nature and extent of the lesion and the specific area of involvement. The main findings are:

1. The brain-damaged group is significantly lower than the control group on Memory Quotient and on all the sub-tests except for Digits Forward and Backward and Associate Learning, where this difference is maintained although it is not significant.

2. In the comparison among the ten focal, seven diffuse and four sub-tentorial brain-damaged patients all three groups show memory impairment in general with the sub-tentorial group indicating the least and the focal group the greatest impairment. While the memory impairment of both the focal and diffuse groups is general and does not seem to follow any particular pattern the sub-tentorial group manifests impairment on those functions which appear to be very sensitive to the factor of anxiety.

3. Comparing the four cases with lesions anterior to the Rolandic fissure with the 13 cases that had lesions that were posterior, the pre-Rolandic group, as a whole, shows no memory loss and is considerably higher in Memory Quotient as well as the sub-tests.

4. In the comparison between the seven cases where the lesion was in the dominant (left) hemisphere and the eight cases with bilateral damage, both groups show lowered Memory Quotient and sub-test functioning although the memory impairment of the group with dominant hemisphere involvement seems to be generally much more impaired.

The relationship of memory functioning to intellectual functioning and of these findings to the cerebral localization theories will be discussed.

Slides.

Division 12. Open Meeting, Executive Committee

9:50-10:50. California Room, Sheraton Palace

Division 9. Discussion Group: Applying Research Results to the Teaching of Social Psychology

11:00-12:00. Franciscan Room, Sir Francis Drake

W. J. McKEACHIE, Chairman

Participants: DONALD T. CAMPBELL AND JACK R. GIBB.

Division 12. Experiments with Rorschach

11:00-12:00. Room A, Sheraton Palace

SAMUEL J. BECK, Chairman

11:00. The effect of experimentally induced frustration on the Rorschach responses of nine-year-old children. WINIFRED B. LUCAS, *Los Angeles State College, Reiss-Davis Child Guidance Clinic.*

The purpose of this experiment was to investigate the influence of experimentally induced frustration on Rorschach responses. The sample consisted of fifty-six children, nine years of age, divided into experimental and control groups which were matched for age and sex. All children were individually administered two Rorschachs separated by an interval of about eight weeks. Each of the experimental children was subjected immediately before the administration of the second Rorschach to frustration in the form of failure, determined through magnetic control of apparatus, to meet the requirements of a pinball game where success would have been highly rewarded.

Analysis of the data by nonparametric methods showed a significant increase in the amount of hostility expressed in the repeat Rorschach records of the control group as compared with an absence of increase in expressions of hostility in the experimental group (as measured by the Elizur Rorschach Content Test). This was accompanied by other significant quantitative changes in the scores of the control group as compared with the experimental group.

CONCLUSIONS: Nine-year-olds tend to react to a normally permissive repetition of the Rorschach with a constellation of changes that reflects an increased freedom to use inner resources and be more expressive, both in terms of ideas and aggressive feelings. Frustrated children, on the other hand, feel less freedom to take advantage of the repeat situation but within the framework of this diminished spontaneity of expression show wide divergence in the intensity and type of defense they adopt to deal with frustration.

11:15. The influence of color in the Rorschach test. EVELYN CRUMPTON, *VA Neuropsychiatric Hospital, Los Angeles.*

An experiment was conducted to investigate the influence of the stimulus color on certain aspects of performance on the Rorschach Psychodiagnostic Test. The Rorschach test was administered individually to a group of thirty subjects (ten psychotics, ten neu-

rotics, and ten organics) and an achromatic version of the test (similar in all respects except for the absence of color) to a comparable group of thirty subjects.

The color stimulus was shown to influence the subject's performance when protocols were evaluated in a global way, but not when consideration was limited to color shock signs. The influence of color was apparent in the conceptual content of responses. The presence of color resulted in a shift in emphasis among content categories as conventionally scored; and it increased ratings of aggression and affect (especially unpleasant affect), as reflected in the content. There was no effect on ratings of anxiety. These results imply that the method of evaluation determines whether color is shown to influence Rorschach performance.

Analysis of data on card preferences and hue-form incongruity ratings suggests that the individual colored cards differ in their stimulus characteristics to such an extent that a reaction to the color on one card should not be given the same interpretation as a similar reaction to another card. It is proposed that: when a card is characterized by a high degree of hue-form incongruity, disturbance probably arises because the subject must choose between the dominant form-suggested association and whatever associations are aroused by the color; when a card is characterized by a low degree of hue-form incongruity, any disturbance probably results from the particular combination of color and form which facilitates an association which is emotionally disturbing to the subject.

11:30. Prognostic significance of the underproductive Rorschach. *BERNARD L. BLOOM, VA Out-Patient Clinic, Boston.*

PROBLEM: Underproductive Rorschach protocols are reported in about one-third of the cases with which the clinical psychologist deals. These protocols present special problems by virtue of the relative absence of idiosyncratic material. Statements regarding prognosis are usually made with considerable tentativeness. (a) What test features distinguish the underproductive protocol of an individual subsequently showing clinical improvement in psychotherapy from the underproductive protocol of an individual showing no improvement? (b) Are these distinguishing features also characteristic of patients showing the same treatment history differences but from whom expressive protocols are obtained?

SUBJECTS: Forty-six male out-patients all meeting the following criteria: (a) minimum, dull normal intellect; (b) no known or suspected intracranial pathology; (c) administration of Rorschach within first

five clinic contacts; and (d) completion of representative test procedure. Subgroups: Group I ($N = 11$) maximum, ten responses; minimum, one rejection; successful psychotherapy (partial or complete remission of clinical symptomatology). Group II ($N = 10$) same underproductivity, no clinical improvement. Group III ($N = 13$) minimum, thirty responses; no rejections; successful treatment history. Group IV ($N = 12$) same productivity as Group III, no clinical improvement.

RESULTS: Group I showed the following differences compared with Group II: .02 level—shorter T/R; .05 level—higher proportion of responses in the left half of the psychogram, fewer rejections; .10 level (considered significant because of the extreme productivity limitation)—higher education, more responses, lower F%, higher H%, more M independent of form level, higher M +%, higher FM +%. Group III showed the following differences compared with Group IV: .01 level—higher education; .02 level—more responses in the right half of the psychogram; .05 level—higher IQ, lower A%, higher EC.

CONCLUSIONS: Certain already established Rorschach indicators of successful psychotherapy were confirmed in the expressive groups. Members of the underproductive groups, however, appear qualitatively different. Furthermore, the same prognostic indicators do not apply. Two factors seem important in evaluating the prognosis of an individual presenting an underproductive Rorschach: (a) extent of guardedness, and (b) nature of available inner fantasy.

11:45. Coaction Compass positions of normal, neurotic, and psychotic individuals as defined by Rorschach determinant scores: A cross-validation. *JOSEPH I. C. CLARKE, Duke University, AND GEORGE T. LODGE, VA Hospital, Durham, N. C.*

Published reports by Lodge and his co-workers have asserted that specific areas of the Coaction Compass effectively differentiate Rorschach performances of normal, neurotic and psychotic persons when the various determinant combinations are processed according to a simple geometric method. The purpose of the present study is to see if similar results can be obtained with totally different patient populations, examiners, and scorers than those used for the earlier investigations.

With the cooperation of Leslie Phillips, Rorschach protocols were provided from the files of the Worcester, Mass., State Hospital of 30 hebephrenic and catatonic patients and 30 neurotics. Records of 30 normals were provided by Howard Friedman of the Syracuse, N. Y., VA Hospital. Coaction positions were plotted for all members of each group, using the same procedure described in the previous studies.

Differentiations among the three groups were in the predicted directions and in each instance were significant well beyond the .01 level of confidence. Weakness in the Affect component definitely discriminated the neurotics as a group from the normals. Weakness in the Control component clearly separated the psychotics from both the normals and the neurotics. The conclusion of Lodge and Gibson that specific areas of the Coaction Compass are associated with definite psychiatric conditions appears to be confirmed.

Slides.

Division 12. Topical Session: Delinquency

11:00-12:00. Room 2127, Sheraton Palace

ALEXANDER C. ROSEN, Chairman

Participants:

ALEXANDER C. ROSEN. Treatment of the delinquent.

CLYDE E. SULLIVAN. The delinquent personality.

VIRGINIA IVES and M. Q. GRANT. The measurement of interpersonal maturity.

STARKE HATHAWAY. Identification and prediction of the delinquent.

Division 12. Symposium: Alcoholism: Theory, Problem, Challenge

11:00-1:00. California Room, Sheraton Palace

WALTER L. WILKINS, Chairman

Participants:

WALTER L. WILKINS. The concept of proneness.

JOHN J. CONGER. Reinforcement theory and the dynamics of alcoholism.

EDWIN M. LEMERT. Alcoholism: the sociocultural situation.

KARL M. BOWMAN. Alcoholism: the therapeutic situation.

THURSDAY AFTERNOON, SEPTEMBER 1

Division 8. Luncheon Meeting, Executive Committee

12:00-2:30. Room 218, Sir Francis Drake

Division 9. Symposium: Personality and Higher Education

1:30-3:30. Franciscan Room, Sir Francis Drake

NEVITT SANFORD, Chairman

Participants: DONALD R. BROWN, MERVIN FREEDMAN, AND HAROLD WEBSTER.

Division 12. Topical Session: Report on Institute on Current Issues in Training in Clinical Psychology, with Respect to Theory, Research, Clinical Methods, and Breadth of Training

1:30-2:30. California Room, Sheraton Palace

VICTOR C. RAIMY, Chairman

Participants: ELIOT H. RODNICK, VICTOR RAIMY, STARKE HATHAWAY, and THOMAS W. KENNELLY.

Division 12 and Society for Projective Techniques. Symposium: Limitations of Projective Methods

1:30-3:30. Concert Room, Sheraton Palace

STANLEY F. SCHNEIDER, Chairman

Participants: HEDDA BOLGAR, ANNELIESE F. KORNER, AND FREDERICK WYATT.

Discussants: HAROLD RAUSH AND JOSEPH ZUBIN.

Division 12. Topical Session: Psychology for the Tuberculous—Are We Meeting the Challenge?

1:30-3:30. Room A, Sheraton Palace

SHALOM E. VINEBERG, *Chairman*

Participants:

JOSEPH NEWMAN. Research sense and nonsense in the psychology of the tuberculous.

ROBERT P. BARRELL. Problems of the psychologist in an NP-TB unit.

JOHN E. WESTEEN. The role of counseling psychology in tuberculosis hospitals and services.

MILDRED B. MITCHELL. Group procedures with tuberculosis patients.

JOHN A. SALAZAR. Irregular discharge—its causes and suggested cures.

Division 13. Symposium: Considerations Relevant to Independent Practice by Consulting Psychologists

1:30-3:30. Room 2127, Sheraton Palace

H. MAX HOUTCHENS, Chairman

Participants: GEORGE K. BENNETT, ALBERT ELLIS, EDWARD GLASER, AND JOHN WATKINS.

Division 16. Symposium: The Gifted Child

1:30-4:30. Auditorium, U. of C. Extension Bldg.

PAUL A. WITTY, Chairman

Studies and interpretations of the nature and needs of gifted children and youth.

Participants:

LEWIS M. TERMAN. The Stanford study of gifted subjects.

T. ERNEST NEWLAND. Psychological problems in meeting the needs of gifted children.

HARRISON G. GOUGH. Factors related to differential achievement among gifted persons.

Educational provisions for the gifted pupil.

Participants:

WARREN A. KETCHAM. The gifted child in the regular classroom.

LILLIE L. BOWMAN. Educational provisions for gifted and superior pupils in the California Public Schools.

JAMES R. HOBSON. Practical provisions for individual differences in a public school system which serve some of the needs of gifted children.

ROBERT C. WILSON. The Portland, Oregon, program for gifted children.

Meeting of the American Psychological Foundation, Inc.

2:00-5:00. Room 2002, Sheraton Palace

J. P. GUILFORD, President

ERNEST R. HILGARD, J. MCV. HUNT, DONALD G. MARQUIS, O. HOBART MOWRER, FILLMORE H. SANFORD, ROBERT R. SEARS, LAURANCE F. SHAFFER, AND CARROLL L. SHARTLE.

Meeting of Committee on Evaluation with Supervisors and Other Representatives of Internships for Doctoral Training

2:40-4:40. Room 2053, Sheraton Palace

VICTOR C. RAIMY, Chairman

Division 12. Symposium: Theoretical and Psychological Aspects of Aphasia

2:40-4:40. California Room, Sheraton Palace

REUBEN S. HORLICK, Chairman

Participants: MARY W. HUBER, FRANK R. KLEFFNER, JOHANNES M. NIELSEN, AND HANS-LUKAS TEUBER.

Division 8. Interpersonal Relations

3:50-4:50. Franciscan Room, Sir Francis Drake LAUNOR F. CARTER, Chairman

3:50. Some dimensions of interpersonal relations in three-man crews. B. FRUCHTER, R. R. BLAKE, AND J. S. MOUTON, *University of Texas*.

PROBLEM: To determine the basic dimensions represented in a set of direct assessments of one another made by members of B-47 crews. To estimate the

reliability of the factors and their validity for a performance criterion.

SUBJECTS: Ninety aircrew members who composed 30 B-47 crews in operational training.

PROCEDURE: A scale consisting of 44 items concerning a variety of aspects of crew relations was developed. Each item formed a nine-point scale on which the crew members could rate themselves, the other crew members, or the crew as a whole. The items were analyzed to determine whether they discriminated reliably among crews. Validity against a performance criterion was also assessed. On the basis of the item analysis results, 86 scores were selected to determine homogeneous item pools. Six tentative-item clusters were formed at the beginning of the analysis and the correlation of each of the 86 items with each of the six keys was computed. Items that correlated higher with a key than those already in it were added, and items with low correlations were removed from the key.

RESULTS: Five stable groups of item clusters were obtained and their common elements were identified as technical competence, leadership, crew coordination, morale, and cooperation. The intercorrelations among the five scales were computed and yielded two second-order factors which were identified as technical competence and interpersonal relations. The reliability and validity for the separate scales as well as for several composite scores derived from them were determined.

CONCLUSIONS: Meaningful and reliable dimensions of interpersonal relationships can be derived from the direct assessments of three-man bomber crews. Such dimensions are valid when used to predict a performance criterion.

This research was performed under contract AF 18(600)-602 with the Crew Research Laboratory, AFP & TRC, Randolph AFB.

4:05. Level of aspiration and sociometric ranking in frustration and gratification. SOLIS L. KATES AND DAVID K. FOOSHEE, *University of Oklahoma*.

PROBLEM: What is the relationship between the individual's sociometric ranking in a group and his aspiration level in performances outside of his group? These hypotheses were tested:

1. In a pencil test of estimated performance in games, subjects with high performance estimates will attain significantly higher sociometric rankings than subjects with low estimates.

2. In activities outside group, subjects with high sociometric ranking have significantly higher aspiration estimates than low subjects.

3. In activities outside group, subjects with high sociometric ranking have significantly greater differ-

ences, following gratification, between aspiration estimates and performance than low subjects.

4. In activities outside group, subjects with high sociometric ranking have significantly smaller differences, after frustration, between aspiration estimates and performance than low subjects.

Three groups of summer-camp boys, seven to thirteen years old, were equated as to age, IQ, and sociometric ranking. Each group had five boys of high, five of low, and five of medium sociometric ranking. After familiarizing themselves with the activity, control subjects estimated their successes for thirty trials of ten attempts each. Frustrated subjects were given fifteen trials before and fifteen trials after the activity was imperceptibly made more difficult. Gratified subjects were given fifteen trials before and fifteen trials after the activity was imperceptibly made easier.

There were no significant differences between performance estimates of the subjects who later attained high, medium, and low sociometric rankings. In activities outside group, high-ranking subjects had higher aspiration estimates than lows. Following gratification, high-ranking subjects increased differences between aspiration estimates and performance more than lows. After frustration, low-ranking subjects showed greater differences between aspiration estimates and performance than highs. High-ranking subjects' aspirations appear more responsive to objective possibilities than lows. Sociometric rankings affect individuals' aspirations outside group.

4:20. Some psychometric variables relating to change in sociometric status. IRVING ROY AND NORMAN COHEN, *Juvenile Diagnostic Center, Columbus Ohio.*

PROBLEM: To test some hypothesized relationships between psychometric variables and change in sociometric ratings.

SUBJECTS: Three groups of fourteen boys, ages eight to twelve, in residence for eight-week periods of study for behavior problems.

HYPOTHESES: Awareness of social rules and conventions as indicated by scores on the Comprehension and Picture Arrangement subtests of the Wechsler Intelligence Scale for Children, is predictive of gain in popularity. Hypercriticality, as indicated by a relatively high score on the Picture Completion subtest of the WISC is predictive of decrease in popularity. Ability to relate to others and delay impulses, as indicated by M responses on the Rorschach, is predictive of gain in popularity. Impulsivity, as indicated by the sum C score on the Rorschach, is predictive of decrease in popularity.

PROCEDURE: Each child rated every other child in the group for popularity by sorting photographs of group-mates from best to least liked during the first and again during the eighth week of residence. The difference between the initial and final ratings was considered an increase or decrease of popularity. The differences between the child's score on the Picture Arrangement, Picture Completion, and Comprehension subtests, from the child's own average weighted performance and verbal scores were correlated with the change in popularity score, M , sum C , and combinations of these two scores were also correlated with the change score.

RESULTS: The following r 's (significant at the .01 level) were obtained between the measures used and the criterion, Picture Completion $r = .54$; Picture Arrangement $r = .45$ and Comprehension $r = .52$. When combined these variables yielded a multiple R of .73. The hypotheses related to the Rorschach were unsupported.

CONCLUSIONS: Several personality measures presumed to be indicators of hypercritical attitudes, social awareness, and compliance were significantly related to change in popularity. Other factors which may relate to change in different situations are discussed and some suggestions for research relating change in popularity to environmental standards are made.

4:35. The effects of choice of working partner on student achievement and attitudes. JOHN V. MOORE, ARTHUR J. HOEHN, AND ARLEN R. STAFFORD, *Training Aids Research Laboratory, Chanute AFB, Illinois.*

Experimental study was made of two methods of assigning working partners in laboratory work of an airplane-engine mechanics' course. Half of the 96 pairs of working partners involved in the study were assigned on the basis of mutual choice; the members of the remaining pairs were assigned by a random procedure. The experimental group made significantly higher scores on a written achievement test administered at the end of the two-week experimental period. Both groups' expressed attitudes toward their training declined in favorableness during the two-week period. The obtained decline in favorableness of attitude was less for those pairs who had been assigned on the basis of mutual choice, the difference being significant at the .10 level. Results are related to the hypothesis that group members' liking for each other is a determinant of the amount of influence the group members attempt and successfully exert on each other.

Division 8. Symposium: Personality and Social Aspects of Highway Safety

3:50-5:50. Empire Room, Sir Francis Drake
T. W. FORBES, Chairman

Participants:

DONALD D. GLAD. Psychological characteristics of individuals with varying accident histories.
ROSS A. MCFARLAND (with ALFRED L. MOSELEY). A procedure for the detection of the accident-repeater driver.
D. J. MOFFIE. Personality measures on fleet drivers.
ROBERT V. RAINY. Adolescent personality in relation to motor vehicle accidents.

Division 12. Symposium: The Role and Training of Clinical Psychologists in Community Mental Health

3:50-5:50. Concert Room, Sheraton Palace
ERICH LINDEMANN, Chairman

Participants: DONALD KLEIN, JON M. VON FELSINGER, AND BENJAMIN PAUL.

Division 13. Presidential Address and Business Meeting

3:50-5:50. Room 2127, Sheraton Palace
GEORGE A. KELLY, *Interdisciplinary Collaboration*.

Division 17. Colloquium Honoring E. K. Strong, Jr. A historical, anecdotal discussion of the origin and development of the Strong Vocational Interest Blank

3:50-5:50. Room A, Sheraton Palace Hotel
HAROLD D. CARTER, Chairman

Participants: E. K. STRONG and early collaborators.

Society for Projective Techniques. Presidential Address

5:00-6:00. Ballroom, Sheraton Palace.
SAMUEL J. BECK. *Personality Research and Theories of Personality Structure; Some Convergences*.

THURSDAY EVENING, SEPTEMBER 1**Division 17. Executive Committee Meeting**

7:30-11:00. Room 2005, Sheraton Palace

Division 16. Meeting: Committee on Accreditation of Training Programs

8:00-10:00. Room 221, Sir Francis Drake
GERTRUDE P. DRISCOLL, Chairman

FRIDAY MORNING, SEPTEMBER 2**Psi Chi National Council Meeting**

8:40-10:40. Room 218, St. Francis

Division 8. Personality and Attitude Measurement

8:40-9:40. Monterey Room, Sir Francis Drake
ALLEN L. EDWARDS, Chairman

8:40. The size-weight illusion test in personality assessment. RUTH E. ALBRECHT AND RICHARD S. CRUTCHFIELD, *Institute of Personality Assessment and Research, University of California, Berkeley*.

A classical perceptual illusion that has not been studied in personality research is the size-weight illusion, in which the perceived size of an object may markedly affect its perceived weight. Thus, the smaller of two similar objects actually equal in weight is judged the heavier.

The present study investigated the relationship of individual differences to the various personality traits and criterion measures (a) in susceptibility to the size-weight illusion, (b) in adjustment of perception with repeated exposures to the illusion, and (c) in carry-over of the illusion when stimulus conditions causing the illusion are removed.

In the Size-Weight Illusion Test, developed for and administered to 100 Air Force captains, the subject was shown two small wooden blocks, unequal in size but equal in weight, each with a small ring on top for hefting. The subject was told that the larger block weighed 300 grams. He was to heft it once, then heft the smaller block and estimate its weight. After twelve such trials *E* made the blocks visually equivalent by placing paper covers over them. The subject made six weight judgments under these conditions and then six more with the paper covers removed.

Several measures derived from the test differentiated the officers in psychologically relevant characteristics. Those officers exhibiting least susceptibility to the illusion are independently rated and scored as superior in intellectual traits, good judgment, and general soundness. The tendency for the illusion to decrease over twelve trials is also associated with favorable personality characteristics, e.g., intellectual efficiency, lack of stubbornness. Early stabilization of judgments appears related to domi-

nance, strong ego organization, and independence. Those officers exhibiting greatest perseveration of the illusion even after the stimulus conditions evoking it have been eliminated are evidently more rigid, suggestible, and emotionally disturbed. Conversely, those officers most responsive to the changed conditions are characterized by greater flexibility, intellect, and emotional spontaneity.

8:55. The Guilford-Martin inventories reanalyzed.

WAYNE S. ZIMMERMAN, *San Diego State College*, and J. P. GUILFORD, *University of Southern California*.

PROBLEM: Intercorrelations of the 13 scores from the Inventory of Factors GAMIN, the Inventory of Factors STDCR, and the Personnel Inventory have twice been used in factor analyses. Lovell found six factors, which she appropriately interpreted as being at a higher level of generality than the 13 that the inventories were designed to measure. Thurstone questioned whether there are 13 dimensions involved. He analyzed the Lovell intercorrelations, substituting reliabilities for communalities. He concluded that the dimensionality was nine. He named and interpreted seven factors somewhat differently from previous names and interpretations.

The 13 factors had originally been found in analyses of intercorrelations of single items. It is our belief that analyses based upon total scores from these inventories cannot appropriately test the hypothesis that these 13 factors exist and that they have the properties indicated by earlier analyses.

PROCEDURE: The decision was to analyze the Lovell data at an intermediate level, utilizing scores from homogeneous subgroups of items for each hypothesized factor. The choice of subgroups was based upon inspection of item content and upon information from previous factor analyses of items and from item analyses. From four to seven score variables were thus set up for each hypothesized factor, resulting in 69 score variables. The sex membership of the examinee was included as an additional variable. Eighteen centroid factors were extracted and axes were rotated orthogonally. The subjects were 213 undergraduates.

RESULTS AND CONCLUSIONS: The dimensionality of these score variables appeared to be at least 13. Of the 13 hypothesized factors, 11 were clearly verified and were interpretable essentially as previously. A twelfth factor, rhathymia, was verified, but without the impulsiveness aspect. The cycloid-disposition score variables separated on two factors, both of which have emotional properties but neither of which is clearly a cycloid factor.

9:10. The construction of a personal value inventory based on character orientation, with preliminary validity data. RALPH W. HEINE, *Veterans Administration, Mental Hygiene Clinic Service, West Side VAH, Chicago, Illinois*.

Fromm and Horney have observed that claims of one person upon another may be resolved basically in only three modes: (a) by moving "against" others and gaining satisfaction through demands or manipulation, (b) by moving "toward" others and gaining satisfaction through entreaty or inducement of gratitude, (c) by moving "away from" others and disclaiming expectation of continuing satisfaction in close relationships. The instrument devised follows this general formulation.

The "Survey of Personal Values" comprised 189 items arranged in 63 groups of three and utilized a forced-choice technique of administration. Items were prejudged as relating to Ego-centric, Competitive, Perfectionist, Receptive, Detached, Resistant, or Marketing orientations. The first three were manipulative or controlling orientations, the fourth represented values inherent in a "toward others" mode of relating, and the last three were resigned or "away from" orientations.

As validity tests, the mean scores of 70 managers, supervisors, engineers, technicians, and clerks were compared with those of 33 men employed as social workers, clinical psychologists, and teachers. Also comparisons were made between the mean scores of 133 men and 147 women. Men in a "helping" vocational role were expected to be more accepting of "toward others" values and less favorable toward manipulation and control than men in the business world. Women were expected to score more highly on "toward others" values than men.

Mean differences were in the predicted direction and with one exception were stable at .03 to .001 level. Of salient interest is the indication that the business men surveyed eschewed direct competition and manipulation in favor of indirect techniques for controlling others. That is, by being "perfectionist"—honest, hardworking, punctilious, scrupulously fair, etc.—themselves, they feel they have the right to demand similar behavior from others. Discussion will include other comparisons and inferences about the organization of personal values relative to interpersonal goals.

9:25. The influence of individual attitude and attitude-intelligence interaction upon scale values of attitude items. RALPH T. GRANNEBERG, *City College of San Francisco*.

The validity of the Thurstone-type attitude scale depends on the assumption that the appraisal of a

given opinion statement will be independent of the attitude of the judge making that appraisal. It is contended by this research that high correlations obtained between sets of scale values determined from the item appraisals of attitudinally distinct groups of judges do not yield a proper test of this assumption. An examination of the separate scale values is required, and this was accomplished in the following manner:

The 130 opinion items employed by the original Thurstone and Chave experiment were judged by 448 psychology students from the City College of San Francisco. Standards of judging competence designed to exclude only those judges who did not follow directions resulted in the elimination of 108 judges. The intelligence of these rejects was found to be generally low.

Two attitudinally distinct groups, one very religious and one not religious, were selected from the remaining competent judges according to personality and behavioral criteria. The item evaluations of these two groups, while highly correlated, are significantly different and the Thurstone assumption is shown to be invalid.

Comparison of a group of mentally superior judges with a group of low intelligence showed that levels of intelligence directly influence the judgmental process in several ways important to attitude scaling and that in addition intelligence interacts with attitude in a complex fashion. What has been termed the "displacement phenomenon" was found to be a product of this interaction, rather than the simple result of high attitudinal involvement.

Item weights of a Thurstone-type scale were shown to vary according to the attitude and intelligence of the judge, and also as a function of the item position in a rating list as well as with the type and thoroughness of the instructions to the judge.

Division 9. Symposium: Personality and Political Participation

8:40-10:40. Auditorium, U. of C. Extension Bldg.

DANIEL J. LEVINSON, Chairman

Participant: A. INKELES.

Division 9. Symposium: Role Theory

8:40-10:40. Empire Room, Sir Francis Drake

T. R. SARBIN, Chairman

Participants: P. BAUM, MASON HAIRE, DAVID RODGERS, AND S. STANSFELD SARGENT.

Division 12. Applications of Tests II

8:40-9:40. English Room, Sheraton Palace

C. L. WINDER, Chairman

8:40. Prognosis of immediate outcome in early schizophrenia. JOSEPH ZUBIN, SOLOMON KUGEL-MASS, AND SAMUEL SUTTON, *New York State Psychiatric Institute, Columbia University*.

8:55. The role of type of distracters in the "concrete" conceptual performance of schizophrenics. LOREN J. CHAPMAN, *University of Chicago*.

PROBLEM: Schizophrenics often sort inappropriately by common visual qualities when asked to sort by more abstract principles. Goldstein and others interpret this as indicating reduced ability to form concepts. The hypothesis tested here is that, for some schizophrenics, this phenomenon partly reflects not inability to form concepts, but rather loss of consistent direction, and that greater distraction occurs when opportunities are provided for incorrect sorting by common visual qualities than by opportunities for sorting by incorrect concepts.

PROCEDURE: The subject was instructed to assign several series of response cards (RC), each containing three drawings of common objects, to one of three 3-figure standard cards (SC), by finding a figure anywhere on RC which is the same kind of thing as (or identical to) the figure on the upper right corner of one of the SC's. One of the figures of each RC is either identical to or shares a conceptual class with the upper right figure on one SC, but also contains two figures bearing one of these two relationships with incorrect figures on a second SC. For each RC a third SC contains no figures that share communalities with that RC, and measures errors resulting other than from sorting by distracter communalities. The concepts used are simple ones such as tools, animals, etc.

RESULTS AND CONCLUSIONS: The schizophrenics ($N = 30$), unlike a normal control group ($N = 30$), equated for age and education, showed more errors when the distracters were identical figures than when they were concepts. Differences were significant, $p < .01$ when correct sorting was by identities, $p < .05$ when correct sorting was by concepts, and $p < .01$ combining the above two. As in a previous study with a similar task, schizophrenics made far more distracter errors than other errors ($p < .01$). Other comparisons are also made.

The findings are interpreted as supporting the hypothesis.

Slides.

9:10. Size judgment of pictures as a function of thematic content for schizophrenic and normal subjects. JESSE G. HARRIS, JR., *Duke University*.

PROBLEM: The hypothesis that size judgment of pictures is influenced by thematic content was tested

on schizophrenic and normal subjects ($N = 25$ for each group). Pictures portraying those mother-son relationships which have been considered to be of importance in the early life of adult male schizophrenic patients (Dominance, Ignoring, Overprotection) were presented on a translucent screen. On re-exposure of the picture at a different size the subject, who sat in front of the screen, adjusted the image to the size of the previous exposure by turning a knob.

The pictures, each accompanied by a verbal descriptive statement, were presented in the following order to all subjects: Neutral (tree and bush), Dominance, Acceptance, Ignoring, Overprotection, Neutral (square).

HYPOTHESES: In judging from memory the size of pictures which portray significant mother-son relationships,

1. Schizophrenic patients will produce more deviant (i.e., less accurate) size judgments than will normal subjects.

2. Schizophrenic patients who have made poor premorbid sexual and social adjustments will produce less accurate size judgments than will those patients who have made good premorbid adjustments. (Assumptions were made that deviant mother-son relationships are conducive to poor premorbid adjustment and that pictorial representations of such deviant relationships are more anxiety-arousing for patients assigned poor premorbidity ratings.)

RESULTS: Hypothesis 1: (a) Mean size estimates—differences between groups were not statistically significant. (b) Variances—Schizophrenic Group was significantly larger on several pictures.

Hypothesis 2: Both Good and Poor Premorbid Groups showed significant deviations in their judgments from the actual size of the standards, the former tending to diminish the size of all pictures and the latter tending to enlarge all pictures except the square.

Assumptions and results are discussed in terms of the principle of secondary reinforcement and the possible operation of an anxiety drive.

This research was aided by NIMH Grant M-629. Slides.

9:25. Simulation of "normalcy" by psychiatric patients on psychological tests (MMPI). HARRY M. GRAYSON AND LEONARD B. OLINGER, *VA Neuropsychiatric Hospital, Los Angeles.*

PROBLEM: This paper, reporting MMPI findings, is part of a larger planned study investigating the capabilities of different kinds of psychiatric patients to simulate normal performance on psychological tests tapping different levels of personality.

SUBJECTS: 45 consecutively hospitalized, testable male neuropsychiatric patients.

PROCEDURE: Patients took the MMPI routinely, and again as "a typical well-adjusted person on the outside" would. Each patient then described his approach on the latter task, and his comments were noted. The authors attempted blind sortings of the original and simulated profiles. The paired profiles were analyzed for changes on each scale and on the total instrument, as well as on the number of scales above the critical t score. Predictions on length of hospital stay, based on the original and altered profiles, were made and checked.

RESULTS: Blind sortings of the original and simulated paired profiles were 81 per cent correct. However, improved test performance did not necessarily mean "normal" performance. Deviant personality pictures were sometimes merely softened while remaining basically unchanged. Cases of "diagnostic shift" to a less severely disturbed type of disorder occurred. Differences in self-concept (inferred from original MMPI) and ego ideal (inferred from simulated MMPI) were revealed. Significant changes occurred on several scales. Patients' statements concerning simulation procedure were often illuminating and tended to support the clinical inferences.

CONCLUSIONS: There are marked individual differences in ability of psychiatric patients to simulate normalcy, some becoming worse in the attempt. Improved performance appears to be a favorable prognostic indication. The double-testing approach used in this study suggests potentialities for fuller understanding of patients and for implementing prognostic techniques. Therapeutic implications of "diagnostic shift" among different kinds of patients are briefly discussed. Sample cases are presented. Slides.

Division 12 and the National Council on Psychological Aspects of Disability. Symposium: Recent Contributions to the Psychology of Disability

8:40-10:40. Concert Room, Sheraton Palace

MORTON SEIDENFELD, Chairman

Participants:

ERIC GLUD. Body image and psychotherapy with the physically handicapped.

PHYLLIS BARTELME. Psychological study of cerebral palsy.

LOUIS MASTERTAN. Use of psychological tests in the prediction of success in rehabilitation.

CLYDE GLEASON. Studies in the occupational adjustment of blinded and paraplegic veterans.

Division 16. Open Meeting: Committee on Gifted Children

8:40-10:30. Room 210, Sir Francis Drake

HARRIET E. O'SHEA, Chairman

Division 16. Symposium: School Diagnosis of the Mentally Retarded

8:40-10:40. Lecture Room, U. of C. Extension Bldg.

HAROLD A. DELP, Chairman

Participants:

JEROME H. ROTHSTEIN. Basic diagnosis by the school psychologist.

SALVATORE G. DiMICHAEL. Additional "team" needed for complete diagnosis.

DAVID H. FILS. Analysis of information—organic, hereditary, psychological facts.

Division 20. Perception and Reaction in Old Age

8:40-9:40. Green Room, St. Francis

HAROLD E. JONES, Chairman

8:40. Pupillary response to light and sound stimuli.

LILLIAN S. KUMNICK, *Fordham University*

PROBLEM: To determine in relation to aging (a) the rate of change in pupillary response to light and sound stimuli; (b) the velocity of the pupillary response to light and sound stimuli during parts of the total process of constriction; and (c) the relative control of the iris over the amount of light striking the retina during the response to light and sound stimuli.

SUBJECTS: 94 ostensibly normal, white Ss between the ages of 7.5 and 90.8 years without known influent pathology selected by means of interviews, neurological and ophthalmological examinations.

PROCEDURE: The size of the pupil was recorded by means of pupillography as it alternately constricted and dilated in response to light stimuli (12.2 ft-c.) of one second duration presented every four seconds. A sound stimulus (97 db) was presented during the series to elicit reconstitution of response.

RESULTS AND CONCLUSIONS: No significant difference in rate of change in the pupillary response under the systematically controlled conditions of the procedure occurred with age in mean maxima and minima pupil diameters, extent of constriction, and response velocity as revealed by the tests of deviation from linear regression. All slopes describing the relationship under investigation were found to be negative and differed statistically from zero. Significant difference in the slope of the regression equations was found only for pupillary constriction between initial and fatigued, and initial and reconstituted re-

sponses. A decrease in the velocity of response occurred to a greater extent during certain intervals of the total process of constriction. No significant change in the relative control of the iris over the amount of light striking the retina occurred with increasing age. Implications of these findings in relation to the aging process will be presented.

Slides.

8:50. The relation of age to the dependency of critical flicker frequency on light-dark ratio. M. BRUCE FISHER, *Fresno State College and Harvard School of Public Health.*

Whether the photosensory process of the retina, at photopic illumination levels, is modified with age was the problem of this investigation.

Subjects were 15 male students, aged 21-24, and 15 male nonindigent institution residents, aged 76-87. The apparatus included an electronically-driven flashing tube and permitted direct control of cycle frequency and light proportion (LP) in the cycle. Critical flicker frequency (c.f.f.) measurements were made by the method of limits in a dimly lit room with a dark field surrounding the 1° test spot. In each of four one-hour sessions the subject was measured under eight conditions of LP and brightness. In two sessions, with flash brightness constant, LP was varied in eight steps from .02 to .98. In two other sessions LP was .40, .50, .95, and .98, and fused brightness was kept constant by filters at 25 and 4.5 ft-l.

The old group had significantly lower c.f.f. under all conditions and their variability tended to be greater than that of the young group. Various treatments of the data, involving light and dark times, total light per flash, and total recovery during dark, gave some evidence, but equivocally, that the old responded differently than the young to shortening the dark interval and changing the brightness.

The major data are explicable by reference to known changes with age in the optic apparatus and the nervous system. If the changes found in c.f.f., as the dark interval was shortened, had sharply differentiated between the old and the young, it would have been good evidence that the recovery (dark) phase of the photosensory process had been modified by age. No clear evidence of such a difference appeared, although the use of higher brightnesses than this apparatus permitted might have shown it.

Slides.

9:00. The judgment of ambiguous stimuli as an index of cognitive functioning in aging. SHELDON J. KORCHIN AND HAROLD BASOWITZ, *Institute for Psychosomatic and Psychiatric Research and Training, Michael Reese Hospital.*

The purpose of this experiment was to investigate cognitive functioning in older persons as reflected in judgments of ambiguous stimuli.

A technique originally proposed by Frenkel-Brunswik, as developed by Krasno, was administered to two groups, widely separated in age. The older sample ($N = 36$) were residents in a home for the aged and included six men and six women in each of three subgroups: 65-74, 75-84, and 85 years and above. The younger group ($N = 24$) consisted of 12 doctors and 12 nurses between 22 and 33 years old. In individual sessions, subjects were shown in sequence 13 plates, so drawn that the first was clearly a cat which through successive small modifications became finally an equally clear dog, and asked to name the animal pictured. Decision time for each judgment was also recorded.

The older and younger groups differed significantly in the quality of performance. Younger subjects maintain the "cat" response until near the center of the series, then shift and continue with the "dog" response thereafter. By contrast there is considerably less regularity in the performance of older subjects: either they persevere the original response and shift less readily as the stimulus changes, or they vacillate in their judgments. Average decision time is significantly slower for the older persons. The relationship between decision time and stimulus clarity also differs between the two groups. Younger subjects respond most rapidly to the first and last parts of the cat-dog series and are slowest in response to the middle (ambiguous) cards. On the other hand, older persons are relatively slow at the beginning, show little change in the middle, and are most rapid in response to the final plates. It is believed that the performance of younger persons is a direct function of stimulus clarity, whereas the judgments of older persons are also affected by the novelty of the task, difficulty in developing appropriate sets, and uncertainty in unstructured situations. These findings are discussed in terms of cognitive organization in aging. Slides.

9:10. Speed of response as a function of perceptual difficulty and age. JAMES E. BIRREN AND JACK BOTWINICK, *National Institutes of Health, Bethesda*.

PROBLEM: The purpose of this study was to determine to what extent age changes in speed of response can be related to perceptual difficulty.

SUBJECTS USED: Employed male subjects were observed, $N = 49$; a young group 20 to 37 years of age and an elderly group 61 to 71 years.

PROCEDURE: The subjects were required to judge which of two lines was the shortest and to reply by

saying "right" or "left" as soon as possible. Pairs of lines were presented tachistoscopically and the response time was measured with a voice key and chronoscope. Between responses the subjects fixated upon a cross placed in the geometric center of the area in which the subsequent lines were presented. The standard line was 80 mm. long and 15 mm. wide; parallel to the standard line and separated by 30 mm. was the variable line. The lines were presented with their long dimension in the vertical position. The variable line ranged from 1 to 50 per cent shorter in length than the standard; the width was not varied. The difference in the variable line length was distributed at both ends of the line, i.e., there wasn't a common base. A warning buzzer was sounded 2.5 secs. before each stimulus pair.

RESULTS: Few errors in response were recorded indicating that the task was above the threshold of seeing even for the elderly subjects using a one or two per cent difference in line length. Reaction time declined as an exponential function of the difference in the line lengths. A significant age difference in speed of response was found for all levels of perceptual difficulty. Preliminary results indicate that variations in perceptual difficulty are not a significant factor in slowing of simple responses with increasing age.

9:20. Age differences in jaw, finger, and foot reaction time to auditory stimuli. JACK BOTWINICK AND JAMES E. BIRREN, *National Institutes of Health, Bethesda*.

PROBLEM: To obtain evidence on the controversy whether "central" or "peripheral" factors are primarily responsible for the slowing in speed of simple voluntary responses with increasing age. It was hypothesized that if changes in the peripheral pathways were primarily responsible for the slowing with advanced age, then, e.g., the foot would be relatively slower in response than would the finger or jaw. Conversely, if central factors were primarily responsible, then the absolute difference between foot, finger, and jaw reaction times would be constant with increasing age.

SUBJECTS: A young and an elderly population of 48 men was studied; The elderly group ranged in age from 61 to 91 years of age, the younger group ranged in age from 19 to 36 years.

PROCEDURE: Auditory reaction time was measured using a 1,000-cycle tone presented with ear phones as the stimulus. Each auditory stimulus was preceded by a visual warning or ready signal; the delay interval between the warning and the stimulus was random between one and six seconds, inclusive. Instruction trials were given for the reactions using the jaw, finger, and foot keys. In all instances the

initial or minimum movement produced the measured response. Each subject gave a total of 150 individual responses distributed as 25 each for the following order: finger, foot, jaw, foot, jaw, finger. For each subject a median reaction time for finger, foot, and jaw was computed. The split-half reliability was, respectively, .92, .96, and .94. The corresponding standard errors of measurement for the fifty trials were .016, .012, and .015.

RESULTS: The reactions of the elderly subjects were not progressively slower as a function of the path length. The age difference between the reaction times of the jaw, finger, and foot reaction times was approximately a constant difference, i.e., about .07 secs. This and other evidence suggests that the slowing with age is a general factor underlying all reactions controlled by the CNS.

First Session. Council of Representatives, APA
(Roll Call of the Representatives of the Divisions and CSPA. Open to all APA members.)

9:00 A.M.-5:00 P.M. California Room, Sheraton Palace

Films. Therapy and Mental Health

9:00-12:30. Colonial Room, St. Francis

9:00. The psychological aspects of cancer. **ARTHUR M. SUTHERLAND, MORTON BARD, AND RUTH B. DYK**

9:43. A nurse's day with the mentally ill. **A. E. BENNETT AND E. A. HARGROVE**

10:12. Search for sanity. **PSYCHOLOGICAL CINEMA REGISTER**

10:46. Therapy in process. **CARL R. ROGERS AND REUBEN H. SEGEL**

11:40. To serve your mind. **NATIONAL FILM BOARD OF CANADA**

12:07. Id. **RICHARD LAWERENCE**

Division 8. Feedback and Social Behavior.

9:50-10:50 Monterey Room, Sir Francis Drake

LEON FESTINGER, Chairman

9:50. Effects of positive and negative feedback upon defensive behavior in small problem-solving groups. **JACK R. GIBB, EWART E. SMITH, AND ALAN H. ROBERTS, University of Colorado (Sponsor, Jack R. Gibb).**

PROBLEM: The hypotheses tested were: (a) Positive feedback will produce less defensive feeling, higher task efficiency, and more spread of participation than will negative feedback. (b) Feeling-oriented feedback will produce less defensive feeling, higher task efficiency, and more spread of participation than will task-oriented feedback.

SUBJECTS: 120 undergraduate students, in 24 groups with five subjects each.

PROCEDURE: Six groups were used in each of four experimental conditions. Each group was given three eight-minute periods of work on the Colorado Story Reconstruction Task. These periods were interspersed with two five-minute periods in which feedback was given to the group by trained group observers. In Condition PF the observers gave only positive information about the apparent feeling atmosphere of the group. In Condition PT the observers gave only positive information about the apparent problem-solving efficiency of the group. In Condition NF the observers gave only negative information about the apparent feeling atmosphere. In Condition NT the observers gave only negative information about apparent problem-solving efficiency. Appropriate measures of the dependent variables listed in the above hypotheses were made during and after the experimental periods.

RESULTS AND CONCLUSIONS: The Likert-type Colorado D-F scale (Defensive Feeling) was administered to all subjects after the first work period and again at the end of each experimental session. Positive feedback produced significantly less defensive feeling, as measured by the scale, than did negative feedback. Feeling feedback produced significantly less defensive feeling than did task feedback.

Positive feedback produced significantly higher task efficiency than did negative feedback. Feeling feedback produced significantly higher task efficiency than did task feedback.

No significant differences were found in the spread of participation. Other findings on subsidiary hypotheses are reported and discussed.

This research is sponsored by the Office of Naval Research.

10:05. Effects of feeling-oriented and task-oriented feedback upon defensive behavior in small problem-solving groups. **ALBERT J. LOTT, JOHN H. SCHOPLER, AND JACK R. GIBB, University of Colorado (Sponsor, Jack R. Gibb).**

PROBLEM: Major hypotheses tested were: (a) Feeling-oriented feedback in small problem-solving groups will produce less defensive feeling, higher task efficiency, and greater spread of participation than will task-oriented feedback. (b) Mixed task and feeling feedback will produce less defensive feeling, higher task efficiency, and greater spread of participation than will either feeling or task feedback.

SUBJECTS: 140 undergraduate students, divided into 28 five-member groups.

PROCEDURE: Seven groups were used in each of four experimental conditions. Each group was given three

eight-minute periods of work on the Colorado Story Reconstruction Task. In three conditions these work periods were interspersed with two six-minute periods in which data were gathered from the group, tabulated, and reported in graph form. Data on task efficiency were used in condition T, on interpersonal feelings in condition F, on mixed task and feeling in condition M, and none in condition N.

RESULTS AND CONCLUSIONS: The Likert-type D-F scale (Defensive Feeling) was administered during and at the end of each experimental period. Feeling feedback produced significantly less defensive feeling than did task feedback. Both feeling and task conditions showed less defensive feeling than did the mixed condition.

Task efficiency measures were higher in the feeling than in the task condition. This difference, while not statistically significant, is consistent with findings from three independent experiments. The mixed condition showed lower task efficiency than either feeling or task conditions. The experimental conditions did not differ in spread of participation but both feeling and mixed conditions showed a significant increase in participation rate.

The data on the mixed condition consistently reverse the original hypotheses. These data, together with findings relevant to subsidiary hypotheses, are discussed in relation to the production of defensive behavior.

This research is sponsored by the Office of Naval Research.

10:20. Veridicality of attitudes toward authority and effects on learning. MURRAY HORWITZ, GABRIEL M. DELLA PIANA, MORTON GOLDMAN, AND FRANCIS J. LEE, *University of Illinois* (Sponsor, Murray Horwitz).

PROBLEM: If subjects inhibit the expected effects of need tensions upon thinking or action, this should theoretically produce a rise in over-all tension level, and therefore reduce learning and retention. In a previous experiment, in which members initially disliked a leader who acted arbitrarily, learning suffered markedly where group norms of friendliness caused the subjects to inhibit subsequent recognition of their hostility. Here we test a further derivation: where members initially like a leader, social situations which create nonveridical judgments of hostility toward him will produce worse learning than situations which allow veridical judgments of liking.

PROCEDURE: 85 ROTC cadets, organized into ten classroom groups, were instructed in making a series of paper objects. The teacher conformed with the subjects' expectations of legitimate teaching behavior. In the nonveridical treatment, however, subjects re-

ceived faked information that all others in the group disliked the teacher for his "arbitrariness"; in the veridical treatment subjects were informed that others liked the teacher.

RESULTS: Significant treatment differences in attitude toward the teacher indicated that the reported unanimity of group opinion was effective in changing subjects' judgments about their "own feelings." The subjects' performance on the material taught them was measured immediately after instruction and again half an hour later. Decrement of performance in the nonveridical treatment significantly exceeded that in the veridical treatment. No difference appeared on a digit-span test. Both measures yielded significant differences in the predicted direction, however, if subjects were eliminated who gave independent evidence of not responding as intended to the treatment variations.

CONCLUSION: Rather than friendly or hostile attitudes, *per se*, the veridicality or nonveridicality of these attitudes toward an instructor appears to have major effect upon learning. Implications for the social psychology of attitudes will be discussed.

Under contract with Group Psychology Branch, ONR.
Slides.

10:35. Individual differences in reaction to failure-induced stress. SAMUEL C. FULKERSON, *School of Aviation Medicine, Randolph Field*.

PROBLEM: It was hypothesized that accuracy of performance under failure-induced stress would be related to hysterical and obsessive-compulsive personality characteristics.

SUBJECTS: 284 Air Force trainees. One hundred forty-six were selected because they showed signs of poor adjustment. One hundred thirty-eight were selected because they were judged to show superior adjustment. The judgments of adjustment were based on psychological as well as training data.

PROCEDURE: As part of a larger experimental screening battery, the MMPI and the McKinney Reporting Test, which introduces a stress experience during testing, were administered. The *Hy* scale on the MMPI was taken to reflect hysterical tendencies, and the *Pt* scale to reflect obsessive-compulsive tendencies. Accuracy was defined in terms of the percentage of correct items attempted on the McKinney. Two accuracy scores were used to classify the subjects: (a) the absolute level of accuracy under stress, and (b) the shift in accuracy from prestress to stress. Separate analysis of variance for the *Hy* and *Pt* scores were made.

RESULTS AND CONCLUSIONS: Subjects who shifted toward accurate performance on the McKinney under

the stress conditions had significantly higher *Pt* scores and somewhat lower *Hy* scores than subjects who shifted toward inaccurate performance. These tendencies were stronger within the poorly adjusted group. This suggests that the change in accuracy was a function of the tendency to use hysterical or obsessive-compulsive defense mechanisms, and that the strength of the defenses was a function of the level of adjustment.

The absolute level of accuracy did not show a consistent relationship to the MMPI scores. There were indications that absolute accuracy may have been a function of the degree of motivation for doing well on the test.

Division 12. Brain Damage II

9:50-10:50. English Room, Sheraton Palace

ROBERT E. HARRIS, Chairman

9:50. Diagnosis of organicity by means of spiral aftereffect. A. COOPER PRICE, *VA Center, Biloxi, Mississippi*, and H. L. DEABLER, *VA Hospital, Gulfport, Mississippi*.

One of the persistent problems facing a clinical psychologist working in a hospital setting is that of having a reliable and valid test for determining organic brain damage. The use of the apparent movement aftereffect as a technique for detection of organic brain involvement was explored. It was hypothesized that organic patients, especially those with cortical involvement, would be unable to perceive it, or perception would be incomplete.

An Archimedes spiral of 920° was turned at 78 r.p.m. by an electric motor commonly used for color-mixing experiments. Testing required about five minutes per subject. Standard instructions were given each subject, and the report of each subject was obtained and scored. Three groups were used:

1. Forty normal adult males employed at the institution, with no known organic impairment.
2. Forty nonorganic psychiatric cases, composed of schizophrenics, manic-depressives, and neurotics (no patients undergoing convulsive therapy were used).
3. One hundred twenty organic cases with known cortical involvement.

The chi-square technique was used to determine the possibility of a statistically significant difference between the organic and the nonorganic cases. In this study data for the organic cases contrasted significantly with the nonorganic in the direction of expectancy. The chi square for these data was found to be significant at the .001 level of confidence. Therefore, organic cases with cortical involvement can be differentiated from nonorganic with high

degrees of certainty by means of the spiral aftereffect technique.

10:05. Intelligence in infantile spastic hemiplegia.

PHILIP N. HOOD, *Vanderbilt University Medical School*, and MEYER A. PERLSTEIN, *Northwestern University School of Medicine*.

A series of 334 spastic hemiplegics has been studied with respect to intelligence. The series represents all of the spastic hemiplegics seen by the junior author during the past ten years and is composed of both private and clinic patients, largely from the Chicago area. Intelligence tests were done by qualified psychologists familiar with testing the cerebral palsied, and the resulting IQ scores were subjected to statistical analysis in such a way that intelligence could be studied with respect to laterality of involvement (i.e.; whether a left or right hemiplegic), sex, time of onset, the presence or absence of convulsions, age, etiology, and the comparison of the spastic hemiplegic group with normal children. The findings of the study are summarized as follows:

1. Spastic hemiplegics were retarded about 20 IQ points below normal individuals. The incidence of mental deficiency was about 25 per cent—corresponding with the incidence reported in older studies but with only about half the incidence reported in more recent studies.
2. Left and right hemiplegics showed no significant differences in intelligence, although a difference was expected in favor of the lefts owing to factors related to cortical dominance.
3. Intelligence was not related to age, sex, or the time of onset.
4. Convulsives showed definite inferiority in intelligence to nonconvulsives, both in mean IQ scores and the incidence of mental deficiency.
5. Intelligence was not related to etiology.

Slides.

10:20. The use of Wechsler-Bellevue ratio scores in the differential diagnosis of brain-damaged adolescents. G. ELIZABETH BRYAN and MORONI H. BROWN, *University of Utah*.

PROBLEM: The ratio method, developed by Hewson, reportedly has been the most successful quantitative technique for differential diagnosis of brain damage in adults. However, the percentage of false-positive diagnosis has been too high for practical clinical usage, possibly because age and sex factors have not been controlled. The present study was designed to investigate whether ratio scores obtained from combinations of particular W-B weighted test scores could distinguish brain-damaged from control adolescent subjects.

SUBJECTS: Of the 40 experimental subjects, 26 had positive neurological diagnoses—19 with moderate to marked involvement, and seven with mild involvement. Of the 14 having negative neurological diagnoses, six were epileptic and eight were suspected of organic damage. One hundred sixty nonreferred public school subjects were selected for controls.

PROCEDURE: Hewson's original ratios were computed for each adolescent subject. Adolescent ratios then were established by adjusting the critical cut-off scores, and eliminating some ratios altogether, so as to yield the lowest percentage of false-positive diagnoses for the control subjects and still produce organic diagnoses for experimental subjects having positive neurological diagnoses.

RESULTS: The Adolescent ratios gave nonorganic diagnoses for 92.5 per cent of the control subjects as compared with 30 per cent by Hewson's ratios. 100 per cent of the 26 experimental subjects with positive neurological diagnoses were "organic" by the Adolescent ratios as compared with 80 per cent by Hewson's ratios. In the negative neurological diagnostic groups, 37.5 per cent of the suspected organics were "organic" according to both Hewson's and the Adolescent ratios, and 67 per cent of the epileptics were "organic" according to the Adolescent ratios in comparison with 16 per cent by Hewson's ratios. Relationships were noted between the IQ and the age at time of injury.

CONCLUSION: W-B weighted test scores in ratio form were found useful in distinguishing between brain-damaged and presumably normal adolescent individuals.

10:35. A comparison of infectious and traumatic brain damage utilizing Rorschach "signs" of adjustment and mental deterioration. IRLA LEE ZIMMERMAN, *School of Medicine, University of California, Los Angeles, AND JAMES L. OETZEL, Pan American World Airways.*

PROBLEM: To compare two groups of individuals with infectious and traumatic brain damage, classified according to type, extent, and location of damage, by use of Rorschach "signs" of adjustment (Davidson Signs) and mental deterioration (Piotrowski Organic Signs).

SUBJECTS: Group I consisted of 100 World War II army veterans with head injuries, selected from the original medical files of the Surgeon General's Office for follow-up study seven years after injury. Group II consisted of 65 individuals having a progressive infectious disease of the brain (neurosyphilis), medically diagnosed according to the progress and extent of infection, plus a control group in which the infection did not involve the CNS.

Results were utilized to answer such questions as the following: Do Rorschach "signs" of adjustment and mental deterioration reveal the presence, type, extent, and location of organic brain damage? Do Rorschach "signs" reveal definitive personality manifestations characterizing the infectious and/or traumatic brain-damage groups?

RESULTS: Rorschach "signs" or adjustment and mental deterioration roughly paralleled the extent and location of brain damage, particularly in subjects with an infectious brain disease. It was not possible to differentiate significantly the total traumatic and the total infectious brain-damage groups from each other or from a control group on the basis of the signs utilized. In terms of personality manifestations, the Rorschach "signs" showed an inhibition of such factors as imagination, reactivity, and creativeness to characterize the milder cases of brain damage. The relationship of these findings to the progress, reversibility, and extent of so-called "mental deterioration" will be discussed.

This research was supported in part by the National Research Council Committee on Veterans' Medical Problems and the Research and Education Division, Veterans Administration, Washington, D. C.

Division 20. Intelligence and Personality in Old Age

9:50-10:50. Green Room, St. Francis

R. G. KUHLEN, Chairman

9:50. The performance of older people on the Wechsler Adult Intelligence Scale. JEROME E. DOPPELT AND WIMBURN L. WALLACE, *The Psychological Corporation.*

In the course of standardizing the Wechsler Adult Intelligence Scale (WAIS) a sample of people over 60 years of age was tested in a special study. This paper reports the results of that testing and describes changes in abilities from age 16 to over 75.

A probability sample of older individuals was drawn from the population in Metropolitan Kansas City. The WAIS was administered to 475 of these people distributed in the following age groups: 60-64, 65-69, 70-74, and 75 and over.

Comparisons were made of scores obtained under standard time limits and those obtained when the subjects were allowed unlimited time. Differences between the scores of men and women were studied for each test and age group. About 25 per cent of the group did not take one or more Performance tests. Comparisons were made of the "complete" and "incomplete" cases in terms of the Verbal test scores.

The allowance of additional time produced no appreciable changes either in scores or rank order of

individuals. Although there was a tendency for men to score higher than women, the differences were small enough to permit combining the sexes in the development of IQ tables. The "complete" cases generally received higher scores than the "incomplete" cases.

Changes in abilities from age 16 to past 75 were studied by combining the old-age data with those for younger groups tested in the WAIS national standardization. The decline in Verbal abilities is relatively small until about age 70, but it is greater in Performance measures. After age 70, decline in both Verbal and Performance abilities is more rapid.

10:00. Age changes in the primary mental abilities in a group of superior older people. K. WARNER SCHAIE AND CHARLES R. STROTHER, *University of Washington.*

Thurstone's Primary Mental Abilities Test (V, S, R, N, and W factors) was administered to a group of 25 male and 25 female college graduates, age 70 to 88. The group was rank ordered by age and divided into five subgroups, each consisting of five male and five female subjects. Educational background as measured in years of school attendance did not differ significantly among the subgroups.

Age gradients were plotted in terms of mean scores obtained for each group after conversion of raw scores to *t* scores by use of Thurstone's norms for young adults. Conventional curves of decline were found on all abilities except word fluency in spite of equal educational background. Differential decline of abilities was also found with Space and Reasoning showing most and Verbal meaning and Number showing least relative decline.

Independent measures of memory loss (Wechsler memory scale) and of loss of motor speed and increased motor-cognitive rigidity were obtained on all subjects and again scored in terms of young-adult norms. The effect of these losses on the decline of mental abilities was studied by correcting the PMA scores in terms of the correlations obtained with above factors. The slopes of the curves of decline were shown to level off, but decline continued to be significant and thus is shown to be somewhat independent of the factors of memory loss, reduced speed, and increased rigidity. The positions of the differential curves of decline were not altered by the corrections.

10:10. Age differences in personality: a comparison of young and old groups of superior ability. CHARLES R. STROTHER AND K. WARNER SCHAIE, *University of Washington.*

Edwards' Personality Preference Schedule, a forced-choice test designed to measure the relative

strength of fifteen different "needs," with social desirability of paired items controlled, was administered to matched groups of elderly (ca. 70-88) and young (ca. 20-28) college graduates. There were twenty-five males and twenty-five females in each group. The null hypothesis was tested with respect to age and sex differences by the analysis of variance method.

Highly significant differences ($P < .001$) between the two age groups were found on the following "needs": "deference," "order," "exhibition," "endurance," and "sex." Equally significant differences on the same "needs" were found for the male and female group, separately.

Sex differences in the younger group were significant at the 1 per cent level only on "aggression"; at the 5 per cent level on "achievement," "succorance," and "dominance." For the older group, there were sex differences on the .1 per cent level on "sex"; at the 1 per cent level on "achievement" and "nurturance"; and on the 5 per cent level on "affiliation," "succorance," "dominance," and "aggression."

Since the PPS is an ipsative scale, it might be argued that the structure of the test could be affected by the age differences which would reflect a different pattern of interrelationships of "needs" for the older group than was the case for the younger standardization population. In order to evaluate this possibility, intercorrelations were computed for the older group and compared with those of Edwards' norm group. Indirect tests of the over-all significance of the differences between the two correlation matrices led to the acceptance of the null hypothesis ($P > .05$). The obtained mean differences would seem to reflect age changes in personality structure rather than shifts in social desirability value of the traits rated.

10:20. Adult age differences in rigidity as revealed in attitude scale responses. CHARLES TAYLOR, *Brigham Young University.*

PROBLEM: To point out adult age differences in response patterns shown in attitude-scale responses in terms of measures presumed related to personality rigidity and intolerance of ambiguity.

SUBJECTS: 600 male service club members, with 200 subjects each in the age ranges of 25 to 35 years, 40 to 50 years, and 55 to 65 years, not differing significantly in regard to religion, educational background, or professional callings.

PROCEDURE: Some research and considerable professional speculation leads to an assumption that personality rigidity increases through the adult years. To test this general assumption, five Thurstone Attitude Scales, arranged for 5-point continuum scoring

and in order of ascending scale values, were administered. Attitude scales provide suitable stimuli for study, since verbal materials have no absolute meanings and such ambiguity as is present is of the sort which is encountered in everyday life. A subject could show rigidity and/or intolerance of ambiguity in any of the following ways:

1. He could be so driven by the need to structure that he would endorse statements in direct conflict with one another.

2. He could use the extremes of the response pattern to emphasize attitudes, in a sense avoiding ambiguity by overstructuring.

3. He could avoid the use of the neutral response, the response of maximum ambiguity.

4. He could fall into extended sequential response patterns, a behavior allied to classical perseveration.

It was assumed that the older groups would show progressively greater frequencies of these sorts of responses.

RESULTS: In the four measures and for all five scales, age trends were in the expected direction; analysis of variance revealed that differences in group means were significant at at least the five per cent level of confidence in every case. Intercorrelations from scale to scale in each of the four measures of rigidity were low and positive. The four measures of rigidity themselves correlated to the order of .25. There was a tendency for greater rigidity to be related to conservatism in attitudes.

10:30. Older persons look at death. HERMAN FEIFEL, *VA Mental Hygiene Clinic, Los Angeles.*

PROBLEM: To determine attitudes toward and the meaning of death for older persons.

SUBJECTS: 40 World War I male veterans at a VA Domiciliary. Mean age 67.0 ± 3.4 , mean IQ 98.1 ± 12.2 , mean educational level 6.5 ± 2.2 .

PROCEDURE: Subjects were asked, via rating scales and an interview-questionnaire technique, to tell how, where, and when he would like to die, at what age periods people are most and least afraid of death, what death means to him, his ideas of what happens after death, etc. Reliability of response categories was determined by an independent judge.

RESULTS: 1. Forty per cent thought death "the end of everything"; a similar percentage viewed it as "the beginning of a new life."

2. The great majority wanted to die suddenly with little suffering, in bed, and did not care about the time of day.

3. Over half stated that the age period of the 70's was when people most feared death, because they "were close to it." Childhood and the 70's were the periods when the group thought people least feared death: childhood because "you don't understand what

it is"; old age because "you've least to live for" and "you're resigned to it."

4. A positive correlation was found between religious outlook on death and the view that people most fear death in old age. A similar relationship existed between negatively held attitudes toward aging and religious orientation about death.

CONCLUSIONS: The implication is that some elderly people resort to a religious outlook to master their anxieties concerning death. The meaning of death appears to be a significant organizing principle in the lives of people. Intellectual changes have been highlighted as the central feature of old age personality. We need to pay more attention to the strivings and anticipations of the older person.

Division 8. Correlates of Authoritarianism

11:00-12:00. Empire Room, Sir Francis Drake

RICHARD S. CRUTCHFIELD, Chairman

11:00. Religious and political commitment in relation to dogmatism and the authoritarian personality. MILTON ROKEACH, *Michigan State University.*

In connection with a larger research on dogmatism two scales were constructed: (a) The Dogmatism Scale, measuring dogmatic ideological adherence regardless of specific content. (b) The Opinionation Scale, measuring rejection of people holding opposing beliefs (e.g., "Only a fool would think that . . .") or qualified acceptance of those holding similar beliefs (e.g., "Any intelligent person knows that . . ."). Half the items measure left opinionation, the other half right opinionation.

It is assumed that certain institutionalized groups, e.g., the Catholic Church, the Communist Party, demand strict adherence to doctrine. We hypothesized that strong group pressures toward commitment will be manifested by relatively high dogmatism and opinionation.

We also assumed that the F and E Scales measure primarily right authoritarianism and intolerance. Accordingly, high F and E means should be manifested only when strong commitment is to right-oriented ideologies; however, low F and E means should be manifested when strong commitment is to left-oriented ideologies.

Subjects were Michigan and New York college students, broken down by religion, and English college students, broken down by political affiliation.

MICHIGAN RESULTS: The Catholic group scores significantly higher than Protestant and "No religion" groups on dogmatism, opinionation, F and E.

NEW YORK RESULTS: The Catholic group scores higher than Protestant, Jewish, and "No religion" groups on F and E and, generally, significantly so.

The Catholic group also scores highest on dogmatism (not significant). It does not differ from other groups on opinionation.

ENGLISH RESULTS: Communists ($N = 13$) score higher than Bevanites, Attleeites, Liberals, and Conservatives on dogmatism and opinionation. Differences are generally significant. But Communists score significantly lowest on F and E.

Variabilities on dogmatism and opinionation are generally the same from group to group. Thus, generalizations must be restricted to groups, not individuals.

Theoretical implications of the results will be discussed.

11:15. The effects of F-scale score, similarity, and relevance of information upon accuracy of interpersonal perception. WALTER H. CROCKETT AND THOMAS MEIDINGER, *Kansas State College*.

PROBLEM: To determine the relation between accuracy of predicting another person's responses to the F scale and (a) the F-scale position of the predictor, (b) discussion with the partner of material relevant or irrelevant to the F scale, and (c) initial F scale similarity between predictor and partner.

PROCEDURE: The California F scale was administered to a large group of undergraduate students. On the basis of these scores, 180 subjects were assigned in pairs to one of six experimental variations. In 30 pairs both members were above the median F-scale score, in 30 pairs both were below the median, and in the remaining 30 one was above and the other below. Pairs were assigned randomly to discuss either child-training practices (relevant to F-scale items) or radio, television, and movies (irrelevant). After a 20-minute discussion, each subject marked the F scale as he felt his partner would respond. Actual and estimated scores were compared by analyzing total scores on the F scale, and by Cronbach's profile-similarity technique.

RESULTS: 1. There was no relationship between F-scale position and accuracy. Low-F subjects consistently judged others as higher than themselves, while High-F subjects judged others about the same as themselves. Thus, the mean of the predicted scores greatly exceeded the actual mean, indicating overestimation of conservatism by High-F and Low-F alike. High-F and Low-F judges did not differ in accuracy as measured by profile similarity.

2. Contrary to hypothesis, subjects who discussed radio, television, and movies were significantly more accurate than those who discussed child-training practices.

3. Original similarity between subjects was the variable most closely related to accuracy. Accuracy

was highest when similar subjects perceived themselves as similar and refrained from making extreme judgments.

The implications of these results for theories of social communication and interpersonal perception are discussed.

11:30. Some psychodynamic correlates of authoritarianism in women. MERVIN B. FREEDMAN, HAROLD WEBSTER, AND NEVITT SANFORD, *Mary Conover Mellon Foundation, Vassar College*.

PROBLEM: To determine whether subjects varying in authoritarianism differ with respect to certain psychodynamic factors. Since publication of *The Authoritarian Personality*, investigation of the psychodynamics of authoritarianism has taken a back seat, while construction of scales designed to measure correlative tendencies and investigation of social attributes of high vs. low authoritarians have moved ahead.

SUBJECTS: Two samples of college women, the second serving cross-validation purposes, $N_1 = 441$, $N_2 = 225$.

PROCEDURE: All subjects were administered the California F Scale and the MMPI. The relationship between the MMPI and F score was investigated in three different ways: (a) F scores and those for each MMPI scale were correlated. (b) Each MMPI profile was categorized on the basis of its most prominent clinical feature, e.g., compulsion neurosis, schizoid trends, hysterical tendency (twelve categories in all), and the F scores for each category examined. (c) Starting with F, the MMPI categories for high, middle, and low F's were examined.

RESULTS: When the somatic items were deleted from the Hysteria Scale, a correlation of $-.41$ between this scale and F was obtained. The items that are stressed by the low F's in this scale express faith in human nature and indicate impunitive handling of hostility. There was a small but significant positive correlation between F and the Psychasthenia Scale, which measures intropunitive tendency. These findings are borne out in the other procedures, e.g., the mean F score for the hysterical category, the impunitive group, is significantly lower than that of the intropunitive group. In the second sample the correlation between F and impunitiveness is $-.43$, but the findings for intropunitiveness are more equivocal.

CONCLUSIONS: Contrary to suggestions in recent literature, F and intropunitiveness are not negatively related, at least in the case of college women. There is a substantial negative relationship between authoritarianism and impunitiveness.

11:45. The effects of imprisonment upon authoritarian attitudes. *LEWIS AUMACK, Utah State Hospital.*

In an attempt to study the effects of continued imprisonment upon authoritarian attitudes, a 55-item authoritarianism scale was administered to a representative sample of 85 first offenders imprisoned at San Quentin, California, for first-degree murder. The subjects varied in length of imprisonment from 0-6 years. Sampling controls were imposed by subdividing the subjects into three two-year groupings and matchings for racial composition, intelligence, and age at time of imprisonment. The authoritarianism scale consisted of 30 F and several PEC items from *The Authoritarian Personality*, selected items from earlier fascism studies, and several original items relating particularly to prison inmates.

Compared to other samples the F-scale mean was higher than any others reported to date although not significantly higher than that of the San Quentin general population. F and non-F items correlated +.61 with means not significantly different. Functional equivalence of the two sets of items was further reflected in the unsystematic intermingling throughout the 14 item groupings resulting from "cluster analysis" (Tryon). Such groupings were not particularly comparable to either the rational groupings of Adorno *et al.* or the empirical groupings reported by Christie for university students.

Although total F-scale scores dropped significantly over the six years, the unidimensional conceptualization of "authoritarianism" is most strikingly challenged by the findings that while certain clusters (e.g., "Will Power") showed a significant negative relationship with time, others ("Authoritarian Aggression") showed no relationship, and still others ("Flight into Reality") showed a significant curvilinear relationship. Insofar as the non-F items failed as a group to show significant changes in relation to situational influences, we may conclude that if the attempt is to measure authoritarian "sources . . . deep within the structure of the person," items presently not included in the F scale may prove more promising.

Division 8. Leadership

11:00-12:00. Monterey Room, Sir Francis Drake

ROBERT L. FRENCH, Chairman

11:00. Leadership: a psychological study. ARNOLD M. OETTEL, *College of Medical Evangelists, Los Angeles.*

Review of writings on leadership reveals an issue basic to its understanding and prediction. This issue consists of two antithetical views regarding determi-

nants of leadership: one emphasizing "situational" or specific factors, the other emphasizing "personality" or more general factors.

An attempt to devise a scale of personality-test items which discriminates leaders from nonleaders and which yields valid results in a wide variety of situations was successful, thus supporting the contention that general (personality) factors can be identified which cut across situational factors.

This scale consists of fifty items from the Minnesota Multiphasic Personality Inventory. The original criterion for the study was established using patients in group psychotherapy at the San Francisco Mental Hygiene Clinic and the Permanente Hospital, Oakland. Reliability of the scale, as determined in an analysis of scores of 82 military subjects assessed at the University of California Institute of Personality Assessment and Research, was .86.

Analysis of the items by logical and correlational study revealed tendencies for leaders to possess the following characteristics: (a) greater social effectiveness, (b) more adequate interactional techniques, (c) greater self-assurance.

An abbreviated version of the 50-item scale (consisting of items appearing in the California Psychological Inventory) was studied on a sample of 812 high school students tested in 16 communities across the nation. From this sample, 56 females and 57 males were nominated as outstanding leaders by their principals. These student leaders attained significantly higher scores on the leadership scale than did the control (unnominated) students in each instance.

Further work, based on two samples of senior medical students assessed at the Institute of Personality Assessment and Research, gave results in support of the above findings. Students rated higher on leadership also differed from nonleaders in displaying more accurate perceptual-cognitive judgments, in both interactional (social) and laboratory experimental tasks.

11:15. Developing a functional theory of leadership. RODNEY A. CLARK, *Human Research Unit No. 2, Human Resources Research Office.*

From data in a study of rifle squads on the Korean front line, a functional theory of leadership has been developed. The theory is stated as follows: The activities of a leader which bring about increased effectiveness of group performance are those activities which affect a change in the group structure of values.

The theory of functional leadership is a useful explanation of relations found in detailed case descriptions of 69 combat rifle squads. Data for the case descriptions were collected by a research team on the

Korean front line during the winter of 1952-53. Various judgments about the data were made by psychologists working in conference.

From the case descriptions it was found that leaders performed five leadership functions which were managing the squad, defining appropriate behavior, modeling, teaching, and sustaining squadmates with emotional support. Statistically significant relations existed between the occurrence of leadership functions and such aspects of group structures of values as strength of groupness, development of group goals, and combat aggressiveness. Also statistically significant were relations between the occurrence of leadership functions and two criteria of squad effectiveness, and relations between the development of group structures of values and the criteria of squad effectiveness.

Since these relations did exist among the variables of leadership functions, group value structures, and group effectiveness, the theory goes beyond the present data to postulate that leadership functions affect values and these altered values determine the degree of squad effectiveness.

The theory gives rise to challenging hypotheses for future research about leadership.

11:30. The relationship between dominance tendencies and leadership choice. LEONARD BERKOWITZ AND WILLIAM HAYTHORN, *Crew Research Laboratory, AFPTRC*.

SUBJECTS: Men who had entered Officer Candidate School three days prior to this study were formed into 19 six-man groups and assigned the task of assembling a footbridge out of precut lumber.

PROCEDURE: At the completion of the task the subjects indicated the extent to which they wanted the others in their group for the position of leader. One week later the ascendance scale of the Guilford-Zimmerman Temperament Survey was administered. In the statistical analysis two men were selected from each of the 19 groups: the highest and lowest subjects in the group on scale A—ascendance. We then determined in each group one subject whom the highly ascendant rater had nominated for leadership and one subject rejected by him for this position. Similarly, in each group we ascertained whom the less ascendant rater had nominated and whom he had rejected for leadership.

RESULTS: The original hypothesis that the ascendance scores of the subjects nominated for leadership by the highly ascendant raters would differ from the scores of the subjects nominated for leadership by the more submissive raters was not supported by an analysis of variance. However, a chi-square test employing ranks instead of raw scores as in the analysis of

variance—and thus correcting for group differences in ascendance scores—did yield results partially supporting the hypothesis. There were no differences between the scores of the nominated and rejected subjects for the more dominant raters. However, there was a significant tendency for the submissive raters to nominate highly ascendant subjects as leaders and to reject other relatively submissive subjects for this position.

11:45. The influence of task perception and leader variation on autokinetic responses. DAVID L. COLE, *Occidental College*.

Following the method developed by Sherif, of utilizing the autokinetic effect to study leadership, this study investigated changes in response to leader "suggestion" accompanying attempts to change task perception and leader perception. One hundred forty-seven college students served as subjects, each serving in one phase of the experiment.

In Phase One, subjects were exposed individually to a small light in an otherwise dark room for one hundred trials of four seconds each. On each trial they were asked to report the amount of movement perceived. A mean movement score was computed for each subject. Subjects of similar mean scores were grouped into groups of three and again exposed to the light. To each group another person was added, who knew the nature of the experiment and on each trial reported movement at extreme variance with that of the group. Individual changes in mean movement scores were noted. These results served as a basis for comparison with results in the other phases.

In Phase Two, the method was changed so that the added person was presented as an "expert" in the task. Under these conditions the subjects who gave evidence of increased defensiveness, however, also were positively influenced by the "expert."

In Phase Three, the subjects were encouraged to regard the task as related to intelligence and the added person as highly intelligent. A marked increase in defensiveness resulted and a tendency to shift mean movement reports away from the direction encouraged by the reports of the added person.

In the final phase the task was described as related to personality. Susceptibility to "leader suggestion" seemed related to sex and in-group variables not detectable in the other phases.

CONCLUSIONS: Response patterns to "leader suggestion" in the autokinetic situation seemed related to variance in task and leader perception.

Division 12. Therapy I

11:00-12:00. Concert Room, Sheraton Palace

DAVID SHAKOW, Chairman

11:00. Psychoanalysts as observers of therapeutic process. R. L. CUTLER, E. S. BORDIN, JOAN V. WILLIAMS, AND DAVID RIGLER, *University of Michigan*.

PROBLEM: To investigate the effects of variations in experience and training of observers on ratings of Depth of Interpretation. An earlier study indicated that clinical psychologists could rate therapy interviews on this variable with considerable agreement, although they were unable to make full use of contextual material. It made no difference whether they had heard the recorded interview or had read transcriptions of it. These results will be compared with those obtained under similar conditions from a group of psychoanalysts.

SUBJECTS: 1. From the previous study, the ratings of 16 clinical psychologists are available.

2. Ratings were obtained from eight psychoanalysts.

PROCEDURE: Each subject rated four interviews. A modified latin-square design was utilized which permitted the systematic variation or control of two methods of presentation, two levels of context, four orders of presentation, and four interviews. Data were treated by the method of analysis of variance and correlation analysis.

RESULTS: 1. Correlation Analyses: The over-all interjudge reliabilities for the analysts were almost identical to those found for the clinical psychologists; however, more experienced analysts yielded significantly higher interjudge reliabilities than analysts in training ($p < .01$, Median Test). In their behavior as judges the psychologists and experienced analysts resembled each other more than either resembled the analysts in training.

The median interjudge reliability for identical conditions of rating was significantly higher than for different conditions. Somewhat better agreement is obtained when less contextual information is available. No differences were found between the typescript and recording methods of presentation.

Interview differences are a significant factor in determining the degree of interjudge agreement.

2. Analyses of Variance Study: The results are quite similar to those in the previously reported psychologist study, interview and judge differences being highly significant, while none of the experimental conditions was significant.

CONCLUSIONS: 1. Rating depth of interpretation from typescript rather than recorded material does not impair the meaningfulness of the ratings.

2. Clinical psychologists and experienced analysts perform this task with almost equal reliability. Further problems will be discussed.

Slides.

11:15. The prediction of behavior in therapy groups. LEONARD P. ULLMANN, *VA Hospital, Palo Alto, California*.

PROBLEM: Patients who could function adequately in group therapy are frequently overlooked in neuro-psychiatric hospitals. A measure with high validity would be helpful as a screening device to locate these people. Such a measure would also aid research in group therapy by providing an independent measure of progress and further hypotheses as to the qualities which make for adequacy in the group situation.

PROCEDURE: 60 hospitalized veterans, members of therapy groups, who had been rated on the Palo Alto Group Psychotherapy Scale, (GTS), were administered six cards of the TAT and the Social Perceptions Test, (SPT). The SPT is composed of twelve cartoons of people in double approach-avoidance situations. The average time of administration of each test was 15 minutes.

RESULTS: Predictions of the GTS were made from the TAT data with a validity coefficient of .58. The average reliability of three TAT raters was .70. Ability to feel social motivations as measured by the SPT correlated .59 with GTS ratings and .63 with the TAT ratings. Rater reliability of the SPT score was .92, and odd-numbered pictures correlated .87 with the even-numbered pictures.

CONCLUSIONS: Both the SPT and TAT predict ratings of behavior in therapy groups at the .0001 level of statistical significance. The results indicate that either test may be used to screen hospitalized neuro-psychiatric patients for group therapy. The SPT seems to be a particularly promising instrument for research in group therapy because of its high rater reliability and adequate alternate forms.

11:30. Studies in pharmacological psychotherapy.

I. Treatment of refractory psychoneuroses and personality disorders with sodium pentothal and desoxyn. KEITH SWARD AND THEODORE ROTHMAN.

This paper concerns the use of pharmacological psychotherapy with 16 moderately-to-severely disturbed patients, all of whom had unsuccessfully undergone previous psychoanalyses over periods ranging from six months to three years. The patients in question were suffering from chronic, lifelong, psychiatric disorders; all but two showed obsessive-compulsive states as either the primary or secondary disorder.

In order to overcome the inaccessibility of this group of refractory patients, we sought to produce an optimal psychophysiological state for psychotherapy with the aid of pharmacological agents. This was done by using minimum dosages of sodium pento-

thal followed by desoxyn, administered intravenously.

The apparent effect of this sequence of drugs was to decrease psychic tension and hypervigilance, to induce a state of alertness, to promote feelings of spontaneity and well-being, to enhance rapport and interpersonal communication, to increase drive and the capacity for fulfilling goal-directed activities, to facilitate greater responsiveness in all channels of communication and to diminish autonomic nervous system overflow—thus reducing the patient's previous insulation to psychotherapy.

The ensuing psychotherapy was intensive, dynamic, and prolonged in character.

Of the 16 patients under consideration, 13 showed slight to considerable improvement; three made no progress whatsoever.

It is our impression that pharmacological psychotherapy has promise of becoming a method of choice for the treatment of refractory, moderate-to-severe psychoneuroses and personality disorders.

Slides.

11:45. Chlorpromazine, alone and as an adjunct to group psychotherapy in the treatment of psychiatric patients. RICHARD C. COWDEN, MELVIN ZAX, J. ROSS HAGUE, AND R. C. FINNEY, *VA Hospital, Gulfport, Mississippi.*

This study examines the efficacy of the drug chlorpromazine (Thorazine) with disturbed schizophrenic patients, alone and as an adjunct to group psychotherapy.

Twenty-four schizophrenic patients from the disturbed ward of the Acute-Intensive Treatment Service served as subjects. They were assigned to one of three groups on the basis of a behavioral rating scale devised for this experiment. One group received chlorpromazine plus group psychotherapy, another only the drug, and the third acted as a control group. All the patients had previously received electroconvulsive therapy and insulin coma therapy without any remarkable change. The type of group psychotherapy is described. The measurements of improvement were purely behavioral ones and included behavioral ratings by attendants, decline in number of neutral wet packs, decline in number of ECT, decline in number of fights engaged in, decline in number of disturbed reports, and transfer to a better ward or discharge. Parametric and nonparametric statistics were used. Both experimental groups improved significantly over the control group; the drug-plus-therapy group's improvement over the drug-only group approached significance ($P < .10$).

Length of hospitalization of patients influenced all results. Chlorpromazine appears to be most effective when used in conjunction with group psychotherapy

for only those patients who maintain a high level of anxiety and have a relatively brief period of hospitalization. The results show how psychotherapy may be greatly facilitated by a physical treatment that leaves the patient accessible and his sensorium clear. Chlorpromazine and psychotherapy appear to be mutually enhancing. Results are discussed in relation to other reported studies.

Division 16. Open Meeting: Committee on School Psychological Services for the Mentally Retarded

11:00-12:00. Lecture Room, U. of C. Extension Bldg.

HAROLD A. DELP, Chairman

Division 16. Open Meeting: Committee on State Certification

11:00-12:00. Room 210, Sir Francis Drake

HELEN E. BOGARDUS, Chairman

Division 20. Business Meeting

11:00-12:00. Green Room, St. Francis

FRIDAY AFTERNOON, SEPTEMBER 2

Joint Meeting of Psi Chi National Council and Student Activities Committee of APA

1:30-3:30. Room 218, St. Francis

Division 8. Interpersonal Perception I

1:30-2:30. Monterey Room, Sir Francis Drake

JACK R. GIBB, Chairman

1:30. Quasi-therapeutic and maladjustive interpersonal attitudes among members of small face-to-face groups. FRED E. FIEDLER AND ROBERT E. JONES, *University of Illinois.*

PROBLEM: Improved adjustment in psychotherapy is presumably due to good patient-therapist relations. The present studies ask how interpersonal relations in a nontherapeutic setting affect personal adjustment and personality change. Two successive studies on members of small peer and military groups identify certain interpersonal attitudes which have quasi-therapeutic or detrimental effects on the personal adjustment of group members.

Preliminary Study

METHOD: 100 entering college students, living in 14 dormitory units of six to eight men, were tested early and late in the semester. Each subject described himself, his ideal self, and each roommate on 24-item rating scales. Each subject also indicated on a socio-

metric questionnaire the roommate to whom he would confide personal problems, his "confidant."

INTERPERSONAL RELATIONSHIP INDICES: These are based on Assumed Similarity (AS) scores indicative of acceptance of, or emotional distance from, others in the group.

CRITERIA OF PERSONALITY ADJUSTMENT: Measures were based on (a) the subject's ability to cope with his problems: grades, Counseling Bureau, and Health Center visits, (b) student's sociometric status and his roommates' indirect ratings of the subject's adjustment, and (c) indices of the subject's self-satisfaction and self-esteem.

RESULTS: Adjustment criteria correlated significantly with various AS scores. As predicted, subjects having close relations with confidants (mutually high AS) improved in adjustment and were better adjusted than those emotionally distant from confidants. Four of six specific AS scores correlated with a composite adjustment criterion below the .05 level.

Cross-Validation Study

Subjects were members of 40 Army Tank crews. Relationship indices and adjustment criteria, including Taylor Anxiety and Army Annoyance Checklist scores, were obtained.

RESULTS: We identified several interpersonal attitudes in small groups which are predictive of level and change in adjustment. Implications of these findings for group assembly and preventive therapy will be discussed.

1:45. Predictability and predictive ability as functions of personality style and self-criticality.

BELA O. BAKER AND JACK BLOCK, *Institute of Personality Assessment and Research, University of California.*

PROBLEM: The experiment was designed to investigate some of the mediating variables involved in accurate prediction of the behavior of strangers.

PROCEDURE: During an assessment program, 66 male undergraduates viewed sound films of standardized stress interviews with nine social objects. After viewing each film, the judges attempted to predict how the social object would sort a set of 54 adjectives so as to describe himself. Accuracy of prediction was evaluated by correlating the predicted self-descriptions with the actual self-descriptions of the social objects.

The nine social objects were selected from a group of 100 military officers who had participated in a previous assessment. They were chosen, on the basis of observer's descriptions, as representing three styles of personality organization (overcontrol, appropriate control, and undercontrol). Within each personality grouping they were selected, by an objective evalua-

tion of their self-descriptions, to represent three levels of self-criticality.

The judges were themselves categorized, by means of observer's ratings, into the equivalent three personality groups, and, by means of their self-descriptions, into two levels of self-criticality. Thus, both judges and objects were systematically varied for both personality style (degree of ego control) and level of self-criticality in a $3 \times 3 \times 3 \times 2$ analysis of variance design with 11 cases per cell.

RESULTS: Accuracy was significantly associated with: (a) level of self-criticality of the social objects ($P < .001$), self-favorable objects being most predictable; (b) personality style of social objects ($P < .001$), overcontrollers being most predictable, and (c) personality style of judges ($P < .06$), overcontrollers being least accurate.

No simple interaction approached significance, but one second order interaction and the third order interaction were both significant.

The results are discussed and some theoretical and methodological implications are noted.

2:00. Empathic ability as a function of similarity and motor response. KENNETH O. SANBORN AND CARSON MC GUIRE, *The University of Texas.*

PROBLEM: To test the proposition that, in a nonverbal situation, representations of one person (Alpha) by another (Beta) are a function (a) of dyadic similarity in experiences, and (b) of mediation processes indexed by Beta's projections of self and motor responsiveness to the Alphas perceived.

SUBJECTS: Eight Alphas representing combinations of experience in a life style (high, low), sex role (male, female), and color caste (Negro, white), and 24 similar Betas ages 17 to 20 years.

PROCEDURES: Alphas were filmed learning an expressive arm movement and responded to a 36-item attribute scale. Each Beta subsequently was filmed and represented himself in the same manner. Then, according to a two-block latin-square design, each Beta viewed films of four Alphas while seated and attached to an arm-movement recorder to obtain amplitude of motor responses (MRV). After each film, Beta responded to the attribute scale to predict Alpha's responses. Transformed values for similarity (SSV), for projection (SPV), for raw empathy (REV), and for refined empathy (TEV) or empathic ability were calculated as proposed by Bender and Hastorf.

RESULTS: SSV's of subsamples of Betas varied in dyadic congruence to Alphas as required by the experimental design. White females projected self-representations most. Negro males projected upon like and females upon unlike Alphas. High status, white, female Betas not only projected but also had a low

amplitude of motor responses and low empathic ability. On the other hand, the high status, Negro, female Betas with medium SPV's and high amplitude of MRV's had high empathic ability in terms of TEV's. CONCLUSION: Experimental results indicated that empathic ability was a negative function of projection of self on to another and a positive function of the degree of similarity in experiences and the intervention of mediation processes indexed by the amplitude of motor responsiveness.

Slides.

2:15. Two types of skill in social perception and their perceived behavioral correlates. URIE BRONFENBRENNER, JOHN HARDING, AND MARY GALLWEY, *Cornell University*.

Taking issue with the common assumption of a single generalized ability in "empathy," "social insight," or the "understanding of others," this study reports data on two different types of skill in social perception: (a) "sensitivity to the generalized other," defined as "the ability to recognize the typical response of persons in one's own culture or subculture"; and (b) "interpersonal sensitivity," defined as "the ability to recognize individual differences in response." Methods are presented for measuring these two skills independently and results are reported for a sample of 72 college students. Moderately reliable measures of "interpersonal sensitivity" and "sensitivity to the generalized other" showed a negative correlation of $-.26$ indicating that the person who judged accurately the typical response of the group tended to do relatively poorly in discriminating differences among individuals.

Persons excelling in the two skills made rather different impressions on their associates in a group discussion as revealed by ratings on an adjective check list. High scorers on interpersonal sensitivity were described by their fellows as somewhat passive (shy, submissive, indifferent) and emotionally labile (warm, immature, impractical, etc.). Sensitive women were perceived somewhat differently from sensitive men. Although still shy and submissive, they were also seen as possessing a number of desirable qualities (observant, helpful, considerate). Sensitive men, in contrast, made a uniformly unfavorable impression. The correlates of accuracy in judging the typical response for the group presented a mirror image to those for interpersonal sensitivity with the accurate person being perceived as outgoing and self-assured and with accurate men making a slightly more favorable impression than accurate women. The sex differences observed are tentatively interpreted as reflecting differing cultural expectations for the male and female role.

Division 9. Symposium: Group Consultation: Facilitation or Manipulation

1:30-3:30. Auditorium, U. of C. Extension Bldg.

FRED MASSARIK AND IRVING R. WESCHLER,
Co-chairmen

Participants: FRED COVEY, AARON SPECTOR, AND WILLIAM WHYTE, JR.

Division 12. Psychophysiology

1:30-2:30. English Room, Sheraton Palace

DONALD B. LINDSLEY, Chairman

1:30. Personal interaction and tension. ROBERT B. MALMO, A. ARTHUR SMITH, AND THOMAS J. BOAG, *Allan Memorial Institute of Psychiatry and McGill University*.

This investigation was supported by the Research and Development Division, Office of the Surgeon General, Department of the U. S. Army, under Contract No. DA-49-007-MD-70.

The present experiment is the fourth study in a program to study interview with objective physiological methods. A new feature of this investigation is the extension of physiological recording to interviewers in addition to interviewees.

Subjects were 19 female psychoneurotics in the Institute. The experiment was divided into two parts. In the first part, the subject told a story from a TAT card. Examiner, a male psychologist, either praised or criticized her story, asked her to reply to his comments, and then made some reassuring remarks. He then informed the patient that Dr. B would be in to see her shortly. Dr. B came into the room with the patient and proceeded to conduct an interview in which he first questioned the patient about her test, asked her other questions, and finally reassured her.

Physiological recordings were taken from all the participants: examiner, interviewer, and patients. Muscle potentials were recorded from neck and from speech muscles, and heart rate was recorded continuously by means of EKG. All speech was recorded synchronously with the physiological tracings.

Results revealed differential physiological reactions to supportive versus threatening attitudes not only in patients but also in examiner. In brief rest intervals following praise, speech-muscle tension fell rapidly, in contrast to static tension following criticism. This phenomenon of differential reaction was noted in examiner as well as in patients. That is, when he was critical his tension remained high in contrast to falling tension after he praised. Related findings were obtained from the second part of the experiment (during interview).

Examiner's diary notes over a three-month period were used in studying the interaction of the experimenter's feeling state with patients' physiological reaction during the TAT. On the examiner's "bad" days patients' mean heart rate rose significantly more than on the experimenter's "good" days.

Implications for theory are discussed.
Slides.

1:45. Management of hostility in adult males with migraine headache: a psychophysiological study of a psychosomatic hypothesis. LEONARD C. VANDER LINDE, JR., *VA Regional Office, Mental Hygiene Clinic, Boston.*

PROBLEM: To determine whether inhibition of the overt, social expression of hostility, i.e., suppression of aggression, is a distinguishing personality attribute of individuals subject to migraine headache. Psychoanalytic theory and clinical observations suggest that a characteristic psychodynamic feature of such persons is to react to ego insult with disproportionate feelings of hostility, and to suppress the overt, social expression of the experienced hostility. The hostility induces tension evidenced by an alteration in physiological equilibrium. Suppression contributes to both an increase in tension and its subsequent maintenance. The hypotheses of this investigation are: (a) Relative to other groups, persons with migraine react to hostility provocation with greater physiological tension; (b) they verbalize less aggression; (c) they retain a higher level of physiological tension.

SUBJECTS: 52 male, outpatient veterans, 26 with migraine headache and 26 controls (asthma, hay-fever allergy patients).

PROCEDURES: The hostility-provoking situation consisted of punishing the subject by berating him for arbitrarily determined failures in his performance on a card-sorting task and by a loud buzzer. Continuous, electronically summated recordings of frontalis muscle action potentials and electrocardiograms provided quantifiable measures of physiological tension. Verbalized aggression was measured by the Rosenzweig P-F, administered as a multiple-choice instrument, and by a questionnaire.

RESULTS: The hypotheses are supported. Migraine subjects showed significantly greater physiological tension than controls in response to provoked hostility ($p < .001$) for both muscle tension and heart rate. They verbalized less aggression than controls on the Rosenzweig P-F ($p < .01$), and on the questionnaire ($p = .01$). They retained a higher level of physiological tension ($p < .01$).

CONCLUSIONS: A suggested formulation is that, when confronted with hostility-evoking stimuli, the mi-

graine-prone person develops excessive tension. Since he cannot readily discharge tension by such conscious, integrated means as verbal expression, he retains greater than normal tension.

2:00. Psychological effect of the male sex hormone on women. JOHN I. WHEELER, JR., *The University of Texas M. D. Anderson Hospital and Tumor Institute.*

This study was designed to investigate psychological change following the administration of male sex hormone to women. It was conducted at the University of Texas M. D. Anderson Hospital and Tumor Institute. The sample was composed of 36 women with cancer of the breast. Eighteen of these patients, who were in need of palliative treatment, constituted the experimental group. The other 18 women formed the control group. Each control patient was matched with her experimental partner on all possible relevant variables. Experimental patients received 50 mg. of methyl testosterone per day. Control patients received a placebo, identically administered. All patients were told by a physician that the medication was "hormone pills." No suggestion was given about any behavioral manifestations which might result from the "hormone" beyond the fact that the patient would "feel better."

The experimental design included a pretest and, six weeks later, a posttest psychological examination. At pretest nine psychological techniques were individually administered. They were all repeated identically at posttest except the Interview, which was altered sufficiently to obtain certain required information. Some later follow-up data were utilized.

The results of the study showed significantly more experimental than control patients responded to the androgenic stimulus with an increase in sex drive. Four aspects of sex behavior were considered the major indices of change in sex drive. These were: (a) feelings toward sexual relations, (b) frequency of intercourse, (c) orgasm proportion, and (d) introspection concerning sex drive before and after hormone administration. The greater number of experimental patients responding with marked increases in sex drive was statistically significant on each of these indices. Slight tendencies for some other personality characteristics to change also appeared.

The data support the hypothesis that male sex hormone is at least one of the important drivers of the sex need in women.

2:15. The late effects of lead poisoning. EVELYN P. MASON, NEAL MIDDELAMP, AND DONALD THURSTON, *Washington University School of Medicine.*

Previous studies of children having had lead poisoning in early infancy suggest that a drop in intellectual functioning occurs after the toxic state. Therefore eleven children treated for lead intoxication have been followed for a 5-10 year period with repeated physical and psychological evaluations.

Initial psychological testing included measures of intellectual and social development (Stanford-Binet Intelligence Scale and Vineland Social Maturity Scale). As the group matured a more complete evaluation of psychological functioning was possible. Tests included Stanford-Binet Intelligence Scale, Vineland Social Maturity Scale, Goodenough Draw-A-Man, Wide Range Achievement Test, Bender-Gestalt Visual Motor Test, and Graham-Kendall Visual-Motor Test.

Statistical results showed a significant increment in IQ after the initial testing. All intelligence quotients were within the normal range at the final testing, but visual-motor defects were noted in all but one case. This deficit presented a serious learning handicap during the primary grades. However, some evidence of a developing compensatory learning capacity was present which suggested that adequate school placement aimed at minimizing the effects of the visual-motor deficit would be beneficial. Counseling of the mothers seemed indicated to reduce an overprotective attitude noted.

The absence of inward driven, hyperactive behavior frequently seen in brain damaged children at the time of the final evaluation suggests that in individual cases this behavior dissipates as the child matures. The child with no visual-motor deficit had the most severe toxic reaction, suggesting that there is no direct correlation between the severity of illness and degree of residual effect.

Data will be presented in mimeographed form.

Division 12 and Society for Projective Techniques.

Symposium: Projective Techniques as Research Tools in Studies of Normal Personality Development

1:30-3:30. Concert Room, Sheraton Palace

L. JOSEPH STONE, Chairman

Participants: VAUGHN J. CRANDALL, HENRY RICCIUTI, AND IRVING SIGEL.

Discussants: WALTER KASS AND SUZANNE REICHARD.

Division 15. Symposium: Learning in Educational Psychology

1:30-3:30. Italian Room, St. Francis

BARRY T. JENSEN, Chairman

Participants: HAROLD D. CARTER, EVAN R. KEISLAR, AND EDMUND V. MECH.

Division 16. Business Meeting and Presidential Address

1:30-3:30. Empire Room, Sir Francis Drake

JUDITH I. KRUGMAN. *Cultural Deprivation and Child Development.*

Division 20 and Western Gerontological Society.

Symposium: The Development of Preretirement Counseling Programs

1:30-3:30. Green Room, St. Francis

OSCAR J. KAPLAN, Chairman

Participants:

JOHN F. HENNING, Research Director, California State Federation of Labor.

LOUIS KUPLAN, California State Interdepartmental Coordinating Committee on Aging.

JAMES A. HAMILTON, Psychiatrist, San Francisco. ROY M. DORCUS, Professor of Psychology, U.C.L.A.

Films. Experimental and Applied

2:00-5:00. Colonial Room, St. Francis

2:00. Chronic brain stimulation in monkeys. DANIEL E. SHEER AND DONALD C. KROEGER.

2:34. Conditioning. UNIVERSITY OF SOUTHERN CALIFORNIA.

2:44. A communications primer. CHARLES EAMES AND RAY EAMES.

3:10. Margin of safety: psychological distance under danger. HEINZ WERNER AND SEYMOUR WAPNER.

3:25. Photographing audience reactions in the dark. LESTER F. BECK, LORIENE JOHNSTON, BERNARD KANTOR, AND CHARLES VAN HORN.

3:39. Military leadership training in human relations. CARL H. RITTENHOUSE.

3:59. Customer relations (Use of continuous film loops in employee training.) SEMINAR FILMS.

4:33. Muscle beach. IRVING LERNER.

Division 8. Determinants of Beliefs

2:40-3:40. Monterey Room, Sir Francis Drake

MARIE JAHODA, Chairman

2:40. The psychodynamic significance of beliefs regarding the cause of serious illness. MORTON BARD AND RUTH B. DYK, *Memorial Center for Cancer and Allied Diseases, New York City.*

This study presents the following hypotheses: (a) a belief is a psychologically unique process influenced by individual life experiences, integrated into a system of character defenses, and functions as a basis for action; (b) there is a direct and demonstrable relationship between an individual's character orientation and the content of a belief established when confronted with a threat to his security.

Interview data from 100 patients studied to determine the psychological impact of cancer and total gastrectomy, abdominal-perineal resection (colostomy) or radical mastectomy were reviewed. It was found that 47 per cent of the patients expressed 72 beliefs regarding the cause of their illness. The 72 beliefs were classified in three categories: self-blame (18), projection (50), and indefinite (4). Beliefs were classified as self-blaming where there was guilt over some real or fantasized past failure or wrongdoing expressed as the cause of illness. Projective beliefs expressed the conviction that the action of an external agent, human or not, was responsible for the illness. In both groups, a rational basis existed for some beliefs, while others were extremely irrational and primitive. Rationality did not appear related to educational level, cultural or religious factors. Of the 50 projective beliefs, 26 identified another person as culpable; and, strikingly, 11 of these beliefs identified emotional tension as the direct cause of illness. A test of internal consistency revealed that in cases where more than one belief was expressed they tended to remain consistently self-blame or projective.

It was concluded that people commonly establish beliefs regarding the cause of illness and that such convictions are necessary mastery techniques in situations of threat. "Believing" is a selective process directly related to individual psychodynamics. Causative beliefs developed by individuals under stress of serious illness can be classified and provide an important clue to personality organization. In addition, a study of beliefs affords insights into the psychopathology of depression, paranoia, and hypochondriasis.

Slides.

2:55. How much invariance is there in the relations of "prejudice scores" to experiential and attitudinal variables? JUDY F. ROSENBLITH, *Harvard University and National Opinion Research Center.*

3:10. Some personality correlates of religious attitude and belief. JAMES G. RANCK, *Teachers College, Columbia University.*

PROBLEM: Previous research has suggested associations of authoritarian ideology with religious conservatism, while data relating submissiveness and psychopathology to specific religious ideology have been equivocal. This study re-examined these relationships, utilizing a large and more homogeneous sample. It was hypothesized that authoritarianism and submissiveness are significantly related to specific religious ideology, and that psychopathology is not.

SUBJECTS: 800 Protestant, male, theological students, from 28 graduate schools, representing the entire conservative-liberal continuum of religious ideology, and all geographical areas of the United States.

PROCEDURE: Subjects completed anonymously a background questionnaire, the Levinson-Lichtenberg and McLean scales of religious ideology, E, F, and TFI authoritarianism scales adapted from the "California studies," a revised Bernreuter dominance-submission subscale, six MMPI subscales, and the Wallen Food Aversion test. Pearsonian correlations were obtained between independent and dependent variables. Conservative versus liberal difference-similarity with parents in religious and family ideology was tested by chi square. The .01 level of significance was adopted.

RESULTS AND CONCLUSIONS: Relationships between authoritarianism and religious conservatism were found to be significant and substantial; the relationship of submissiveness and conservatism was significant but low. Neurotic, paranoid and psychasthenic syndromes were insignificantly related to specific religious ideology, while low but significant relationships were found between (a) hypomania, (b) feminine interests, and (c) religious liberalism. In the main, sociological background variables were insignificantly related to religious ideology, but religious liberals differed markedly more with their parents in religious and familial attitudes than did conservatives. Of all the dependent variables, traditional family ideology had substantially the highest correlation with religious conservatism.

It was concluded that differences in adult religious ideology on a conservative-liberal continuum are not generally associated with pathology. Rather, they appear to be related, either as products of conformity, permissiveness or reaction, to the early environment, and particularly to family influences.

3:25. Authoritarianism, social class, and the "Iron Curtain Situation." WILLIAM J. MACKINNON AND RICHARD CENTERS. *University of California at Los Angeles.* (Sponsor, Richard Centers)

PROBLEM: Exploration of orientations toward an ambiguous aspect of Russia's internal system to uncover attitudes, beliefs, and their relationships as determined by class interest and authoritarian dynamics.

POPULATION: A cross section of 460 people in Los Angeles County.

PROCEDURE: Respondents were dichotomized into authoritarians and equalitarians on the basis of Sanford and Older's Short Authoritarian-Equalitarian Scale. Social classes were determined by Centers' class-affiliation technique. To save words, "middle class" will here be substituted for "combined middle and upper classes," and "working class" for "combined working and lower classes." Respondents were asked

questions about the Russian politico-economic system and then asked for their feelings concerning it. **RESULTS:** Making a comparison between the societies of Russia and the United States, the middle class ascribes a greater range of personal income to Russia more often than does the working class ($p < .025$). The percentage of authoritarians making this same ascription nonsignificantly exceeds that of equalitarians.

On the other hand, equalitarians and middle class affiliates, more often than authoritarians and working class affiliates, hold that Russian belief anticipates future elimination of class differences in the Soviet (each $p < .01$).

Within the group belonging to the working class and possessing the two mentioned social-leveiling conceptions about Russia, equalitarians exceed authoritarians in selecting "in between" rather than "mostly bad" to describe their feelings about the Soviet system (exact $p = .05$; $N = 24$). (Only six persons in 460 chose "mostly good." They are omitted from the 2×2 breakdowns reported in this paragraph.) In regard to middle class members who hold both beliefs, ambivalence again occurs more often among equalitarians (exact $p = .06$; $N = 31$). However, in both working class and middle-class groups holding neither belief, personality differences in ambivalence are such as occur more often than not by chance alone (N 's = 82 and 60).

Interpretations emphasize ambiguity, class interest, and personality dynamics.

Division 8. Discussion: Social Factors in Therapy

3:50-4:50. Franciscan Room, Sir Francis Drake
ELMORE A. MARTIN, JR., OTTO VON MERING, FRITZ REDL, AND ALVIN ZANDER, Co-Chairmen

(Following a general discussion, this session will be divided into four smaller groups for further discussions in Rooms 214, 221, 217, and 218 in the Sir Francis Drake.)

Division 8. Social Perception

3:50-4:50. Monterey Room, Sir Francis Drake
ARTHUR F. JENNESS, Chairman
3:50. Psychological tensions and perception. ALLEN D. CALVIN, CHARLES HANLEY, FREDERIC K. HOFFMANN, AND L. THOMAS CLIFFORD, *Michigan State University*.

PROBLEM: In *Theory and Problems of Social Psychology*, Krech and Crutchfield attempt to develop a perceptual theory of social behavior. One of their central postulates is stated as follows: "Instabilities in the psychological field produce 'tensions' whose effects on perception, cognition, and action are such

as to tend to change the field in the direction of a more stable structure." The present experiment supplies empirical findings relating to this proposition. Specifically, the present study was designed to test the following hypotheses: (a) anti-McCarthy subjects when compared to pro-McCarthy subjects will tend to give a lower estimate of the strength of McCarthy's support in a perceptually ambiguous situation, and (b) pro-Stevenson subjects when compared to pro-Eisenhower subjects will tend to give a higher estimate of Stevenson's support in a perceptually ambiguous situation.

SUBJECTS: 843 students from Introductory Psychology classes; 352 were tested in the spring of 1954 before the Army-McCarthy hearings, and 491 were tested in the fall of 1954 after the hearings ended.

PROCEDURE: Subjects answered the following questions: If Senator McCarthy was running against Senator X, whom you did not know, would you vote for Senator McCarthy? Estimate what percentage of this class is pro-McCarthy. In the last Presidential election, did you or would you have voted for Eisenhower or Stevenson? Estimate what percentage of this class was pro-Stevenson.

In approximately one-half of the classes, the McCarthy questions were asked first; in the remainder of the classes, the Stevenson question came first.

RESULTS: Anti-McCarthy subjects gave significantly lower estimates ($p < .01$, Smirnov test) of McCarthy's support than pro-McCarthy subjects. Although pro-Stevenson subjects tended to give a higher estimate of Stevenson's support than pro-Eisenhower subjects, the difference was not significant. The implications of these findings for theories of social behavior are discussed.

Slides.

4:05. A study of psychoanalytic symbolism in relation to stimulus generalization. ROBERT C. NICHOLS, *VA Hospital, Houston, Texas*.

PROBLEM: Stimulus generalization gradients have been demonstrated along verbal dimensions of similarity of meaning, and it has been shown that in the case of generalization of the galvanic skin response (GSR) this can take place without conscious awareness. The present research was designed to determine whether or not symbolic relationships as postulated by psychoanalytic theory constitute such a similarity dimension so that stimulus generalization can be demonstrated among symbols and their referents.

PROCEDURE: 24 students from an introductory psychology class were used as subjects. For one-half of the subjects a conditioned GSR was established to the verbal concept of masculinity, while a similar conditioned response was established to the verbal concept of femininity in the other half of the sub-

jects. A list of words containing synonyms of the conditioned stimuli, masculine symbols, feminine symbols, and words considered to be neutral in sexual content were then presented verbally to the subjects in a rotated order. The magnitude of the GSR to these stimuli was recorded.

RESULTS: Analysis of the data indicated that a significantly decreasing generalization gradient was established. For the total group of subjects the largest generalized response was to the synonyms, next to the Freudian symbols, and least to the neutral words. The analysis of variance, however, showed that the difference between the groups receiving different conditioned stimuli was not significant.

CONCLUSIONS: The results of this experiment support the psychoanalytic hypothesis that certain concepts considered to be sexual symbols are more similar to the concepts of masculinity and femininity than are neutral concepts. However, the hypothesis that certain symbols are primarily masculine while others are mainly feminine is not supported by these data.

4:20. Concepts of "Mom" as a determinant of the perception of young women. PAUL F. SECORD AND SIDNEY M. JOURARD, *Emory University*.

Considering the judging of personality from faces as a problem in social perception, in which many factors may act as determinants, the present inquiry tests the following hypothesis concerning one such determinant: Each judge will tend to rate photographs of young women in a direction away from the group mean which corresponds to the direction in which his mother-concept deviates from the modal mother; i.e., if a judge rates his mother higher on the trait "sincere" than other judges rate their mothers, he will also rate women higher on "sincere" than do other judges. This phenomenon is termed attribution.

On a seven-point scale consisting of 20 traits, 59 judges rated their mothers and four groups of photographs: HiMor, LoMor, HiAmb, and LoAmb. The groups HiMor and LoMor had previously been shown to represent extremes in the degree of moral character attributed to them, moral character being represented by a correlation cluster of such traits as "faithful," "good-mother type," etc. Of the other two groups HiAmb had previously yielded low agreement among judges, and LoAmb, high agreement. Attribution on a trait was measured by computing a Pearsonian r ($N = 59$) between mother-ratings and ratings of a picture group.

That attribution occurs was confirmed by many significant r 's for three of the four photograph groups. A corollary that the amount of attribution will vary positively with degree of moral character of photographs was also confirmed by many sig-

nificant r 's for HiMor and few for LoMor. A second corollary that attribution would vary directly with ambiguity of the photographs was not confirmed. Alternative interpretations of r 's in terms of response sets, etc., were ruled out by special analyses.

Implications of the phenomenon of attribution for interpersonal relations, for the theory of projection, and for projective test methodology were briefly discussed.

Slides.

4:35. Intersensory and visual field forces in size estimation. PHILIP HOLZMAN, *The Menninger Foundation*.

Size-estimation experiments based on the Bruner-Goodman model generally report tendencies to overestimate disks larger than the size of a nickel. This finding suggests that two generally overlooked variables, other than value, may be equally important: (a) a size-weight illusory effect in which heavy disks are overestimated more than light ones, and (b) an "inherence" effect in which surfaces with diffused boundaries appear larger than strongly contoured ones. The size-weight effect is especially present when disks are hand-held, or when heavy-appearing disks are compared with light-appearing disks of similar size.

Sixty subjects judged the size of three hand-held disks: (a) 48.5 millimeter gray disk of 65 grams; (b) 48.5 millimeter gray disk of 10 grams; (c) 50 millimeter black disk of 10 grams. The results supported the hypothesis that the heavy disk would be most overestimated because of the size-weight illusion and that the black disk—because it was the most contoured when held against a flesh-colored ground—would be least overestimated because of the "inherence" effect.

To control the influence of weight, subjects judged four smaller disks without holding them. An equal number of over- and underestimations occurred.

These findings suggest that phenomenal size depends significantly upon intersensory and contour forces in the visual field. Consideration of these factors and individual differences associated with them provides firmer ground for isolating the influence of "value" and "meaning" upon perceived size.

Slides.

Division 12. Symposium: Experimental Approaches to Psychoanalytic Theory

3:50-5:50. Ballroom, Sheraton Palace

EDWARD C. TOLMAN, Chairman

Participants:

E. R. HILGARD. The psychoanalytic model in learning theory.

DAVID SHAKOW. Long range program for experimental investigations of psychoanalytic theory.

NEAL E. MILLER. Animal investigations bearing on psychoanalytic concepts.

ROBERT R. SEARS. Experimental design and methodological difficulties in testing psychoanalytic hypotheses.

Discussants: HANNAH FENICHEL and ABRAHAM KAPLAN.

Division 12. Symposium: Trends and Problems in Intern Training

3:50-5:50. Comstock Room, Sheraton Palace

IRWIN J. KNOFF, Chairman

Participants:

WILLIAM A. HUNT. A resume of recommendations for intern training reached at the Boulder Conference, and an appraisal of trends and problems in intern training as viewed by a graduate department of psychology.

W. MASON MATHEWS. A description and evaluation of an intern training program.

WILLIAM M. HALES. The operating philosophy of the VA towards intern training and a general overview of trends and problems.

CHARLES R. STROTHER. A discussion of the work of the committee on evaluation with regard to the need for and the establishment of criteria to be employed in the evaluation of intern training programs.

IRWIN J. KNOFF. A report of the findings obtained from surveying graduate departments and intern facilities with respect to trends and problems in intern training.

Division 15. Learning in School Situations

3:50-5:50. Italian Room, St. Francis

D. A. WORCESTER, Chairman

3:50. Motivational orientations and scholastic achievement. WILLIAM F. BROWN, *USAF School of Aviation Medicine, Randolph Field*, CARSON McGUIRE, and WAYNE H. HOLTZMAN, *University of Texas*.

PROBLEM: (a) To examine hypotheses and develop methods of analyzing biographical information and relative behavior involving choices among stimuli for underlying motivational elements which are a residual of experience in family, peer, school, and other contexts. (b) To derive and validate psychometric instruments utilizing motivational orientations for prediction of scholastic achievement in college. (c) To identify common factors in the new instruments and other sociometric and psychometric measures reported to be predictive of scholastic achievement.

SUBJECTS: 2,750 high school seniors and college freshmen in three stages of the research.

PROCEDURES: (a) A 110-item Inventory of Student Attitudes (ISA) was constructed. Item responses of 577 graduating seniors in three high schools were analyzed with four-year grade-point averages as criteria. A 159-item Student Biographical Inventory (SBI) was devised and administered to 720 entering freshmen in three colleges. First-semester grade averages were employed as criteria for item analysis. Scoring keys for men and for women were constructed for each instrument. (b) The ISA and SBI were cross-validated on 1,400 freshmen enrolled in two colleges. (c) Data for two 17-variable matrices were obtained from 213 women and 199 men tested at Southwest Texas State Teachers College.

RESULTS: Validity coefficients for the SBI were .45 for men and .40 for women. For the ISA, coefficients were .40 and .34, respectively. Correlations with ACE were consistently low. Factor analysis yielded a general scholastic achievement factor and additional factors defined chiefly by measures derived from sociometric ratings, by tests designed to assess motivational orientation, and by tests of academic aptitude.

CONCLUSIONS: Both instruments measure attributes significantly related to academic success which are not assessed by a scholastic aptitude test.

Slides.

4:05. Personality and spelling ability. JACK A. HOLMES, *University of California, Berkeley*.

The purpose of this study is to discover the relationship, if any, which certain personality traits bear to spelling ability at the college level.

Five independent samples (N 's = 183, 130, 101, 94, 196) were drawn in successive semesters from students enrolled in educational psychology. Each sample was given a 5-choice multiple-choice spelling test, plus a dictation-write-in-spelling test. The Heston Personality Adjustment Inventory (HPAI), the Johnson Temperament Analysis (JTA), and the Minnesota Multiphasic Personality Inventory (MMPI) were given singly, or in combinations, to the various samples. Multiple correlation analyses were performed on the intercorrelation matrices for each sex, and for the totals of each sample.

Positive and consistent results were obtained from sample to sample for some variables, while inconsistencies developed for others. To correct for overlap, all significantly related subtests from the various samples were gathered into one battery and given to a new sample, along with a spelling test. Analysis revealed interesting consistencies with the previous samples: For males, the personality factors most closely related to spelling ability appear to be lack of confidence, low hypochondriasis, high analytical

thinking, high activity, and a tendency to get a high F or validity score. For females, the personality factors most closely related to spelling ability appear to be a tendency to get a low F or validity score on the MMPI, high psychopathic deviate, and low hypomania scores. Contributions to the variance of spelling ability are reported.

Slides.

4:20. Method of presenting word pairs as a factor in foreign vocabulary learning. FELIX F. KOPSTEIN AND SOL M. ROSHAL, *Training Aids Research Laboratory, AFPTRC*.

The influence of stimulus and response term synchronization on the learning of a list of eight foreign words, presented as paired associates with their English equivalents, was studied. Under condition "A" the English stimulus term and the foreign response term of each item were projected on a screen simultaneously for $3\frac{1}{2}$ seconds; under condition "B" the stimulus term alone was displayed for the first 2 seconds and was then joined by the response term for the remaining $1\frac{1}{2}$ seconds.

Twelve repetitions of the eight-item pair list were presented. The fourth, eighth, and twelfth repetitions were used as test series. The material was presented to 48 groups of basic airmen under the first condition and to another 48 groups under the second condition.

Learning theory has some implications for a comparison of these two methods of presentation. Contiguity theory suggests advantages for the simultaneous presentation of both terms, while reinforcement theory suggests factors favoring the other form of presentation.

There was reason, however, to expect that the superiority of one method over the other might be a function of the point on the learning curve at which the measurement was made. During the initial stages of training, the foreign (strange) response terms themselves would presumably need to be learned (distinguished) quite apart from learning to pair them correctly with the stimulus terms. Hence, their longer exposure under condition "A" would be advantageous. Later practice could be expected to become more concentrated on the pairing of appropriate stimulus and response terms, and, therefore, the length of time that the response term was exposed would be of lesser import.

Results indicate that the simultaneous presentation method is very significantly superior in the early stages of training. This advantage for the simultaneous presentation method becomes distinctly less important as more substantial levels of learning are reached.

Slides.

4:35. Schoolroom motivation: Quantity (Q_r) and pattern (P) of verbal "reinforcement" as variables related to routine performance under massed training. EDMUND V. MECH, ERVIN KAPOS, *University of Oklahoma*, AND WILLIAM H. FOX, *Indiana University*.

PROBLEM: Since verbal incentives include one aspect of the schoolroom environment that a teacher can manipulate it seemed sensible to examine what might realistically be expected of specified verbal stimuli, in terms of exerting performance changes in pupils. The study was concerned with the effects of quantity of reinforcements (Q_r) administered in either a periodic (P_p) or random (P_r) pattern, upon the routine arithmetical performance (M_{ap}) of subjects classified as belonging to one of three intelligence levels.

PROCEDURE: Subjects were 325 third-and fourth-grade pupils. Ten groups were employed, five of which received 100%, 75%, 50%, 25%, and 0% reinforcement in a periodic pattern (P_p). The remaining groups received the same quantities of reinforcement in a random pattern (P_r). The two zero per cent groups served as controls. Subjects received three pretest trials and twenty-eight "acquisition" trials. The total number of trials was 10,075. Each of thirty-one trials was four minutes in length, the subject being required to perform a routine arithmetical task. "Reinforcement" of the Hurlock type was administered in accordance with the quantity and pattern assigned for each group. Using the Otis test, three intelligence levels were formed on the following basis: High (I_h) = 110 or above, Medium (I_m) = 90-109, and Low (I_l) = below 89.

RESULTS: Using a single classification analysis of covariance, initial measures were computed against cumulated performance over twenty-eight trials. A disproportionate N required the use of the covariance solution suggested by Tsao. Twenty-nine such analyses were executed. Only those F values reaching significance at the .01 level were accepted. The salient results were: (a) (Q_r) increased the occurrence of (M_{ap}) when administered for 75 per cent of the trials, (b) (Q_r) appeared most effective when administered in a Periodic (P_p) pattern rather than in a Random (P_r) pattern, and (c) (Q_r) administered in a Periodic (P_p) pattern produced positive results with pupils of medium intelligence (I_m) level.

Slides.

4:50. Characteristics of effective verbal instruction. VIRGIL J. O'CONNOR, *United States Air Force Academy*.

This investigation undertook to analyze classroom films for as many characteristics of presenta-

tion as were measurable or qualitatively assessable, then evaluate each in its relation to the amount of presented information which was recalled by the student, and finally apply certain characteristics in a classroom experiment.

Presentation characteristics numbering twenty-one in all were measured in twenty-seven instructional films and correlated with recall test scores of students viewing the films and with ratings of teachers evaluating the films. The eleven characteristics listed below correlated with test scores or film ratings at a level that indicated a real, nonchance relationship.

1. Scenes reproducing visual experience.
2. Scenes symbolizing visual experience.
3. Scenes per minute of film time.
4. Words per scene.
5. Scenes of human activity.
6. Words with personal referent.
7. Dramatic quality of the presentation.
8. Demonstrated statements.
9. Affixes per hundred words.
10. Nouns with universal meaning.
11. Nouns with concrete referent.

A teaching experiment was then designed to investigate the practicability of controlling individual characteristics of a presentation and to make a further test of the effect of two measures of film commentary: Affix loading and personal reference, measures that appeared to be independent in the film analysis. A half-hour narrative on nine types of clouds was presented in four variations to classes of student weather observers. The experiment was factorially designed to permit a separate test of the statistical significance of the effect of each experimental variable independent of variations in test forms or in mental ability or previous knowledge of subject matter on the part of the students.

The experimental results demonstrated a statistically significant relationship between affix loading and amount of recall. Results did not show relationship between variation in personal reference and differences in recall.

5:05. A comparative analysis of some outcomes of instruction by kinescope, correspondence study, and classroom procedures. THOMAS S. PARSONS, *University of Michigan*.

PROBLEM: The comparison of kinescope-correspondence groups without an instructor, normal classroom experience, and independent correspondence study for their relative effectiveness as methods of providing university-level instruction in identical subject matter.

SUBJECTS: Each of twenty students enrolled in the experimenter's developmental psychology course was

randomly assigned to one of the three experimental instructional treatments. Twenty students concurrently enrolled in the experimenter's educational sociology course were used as controls.

PROCEDURE: The control group was compared with the experimental groups for relative achievement only. The three experimental groups were compared on achievement, durability of achievement, group cohesiveness, congruence of course-related opinions, amount of intragroup structure, preferences among the experimental treatments, and ratings of the course's personal value. Data were collected pre-, mid-, and postinstruction by a standard achievement test, the Libo cohesiveness questionnaire, a sociometric test, and *ad hoc* questionnaires.

RESULTS: No significant differences in achievement appeared among any groups at the outset. Postexperimentally, however, the difference in achievement between the experimental groups and the control group was significant ($p = .001$); whereas there remained no significant differences among experimental groups.

Similarly, no significant between-groups differences in cohesiveness appeared throughout the semester. However, comparisons of the amount of congruence of content-related opinions indicated a significant decrease for the correspondence group, but no significant changes for the other two treatments. Measures of the degree of intragroup structure showed a significant ($p = .05$) increase during the semester for the classroom treatment, and a not quite significant decrease for the kinescope group. Postcourse comparisons of the classroom and kinescope groups on this variable revealed a difference significant at almost $p = .01$.

The subjects' preferences among the three experimental treatments bore a highly significant positive relationship ($C = + .80$; $p = .001$) to the treatments to which they had been assigned. Almost all preferences which deviated from this tendency were accounted for by members of the instructorless groups who preferred the classroom experience.

Course evaluations were highest for the classroom group and lowest for the kinescope group; and although these differences were not significant at $p = .05$, they bore a small positive relationship ($C = + .60$) to the experimental treatments arranged in the order of most (classroom) to least (correspondence) similarity to customary educational methods.

5:20. Delayed comprehension and its relationship to other aspects of reading and to academic success. ARTHUR W. SHERMAN, JR., *Sacramento State College*, and FRANCIS P. ROBINSON, *The Ohio State University*.

PROBLEM: To determine (a) the general characteristics and most effective methods of measuring delayed comprehension, (b) its value in college testing programs, and (c) its relationship to other reading skills and to academic success.

SUBJECTS: 378 men and 277 women in freshman English classes at The Ohio State University.

PROCEDURE: A specially designed reading test consisting of a long prose passage and a chart and graph reading subtest was constructed. Two sets of items to measure comprehension of the prose passage were constructed and equated. The test was administered as follows: a long prose passage was read for 20 minutes, followed immediately by one set of comprehension items. After a delay of 24 hours, the chart and graph reading test and the second set of comprehension items were administered.

RESULTS: An intercorrelation matrix was prepared for the following variables: grades (point hour ratio), immediate comprehension score, delayed comprehension score, reading rate, chart and graph reading, and Ohio State Psychological Examination. Multiple *R*'s obtained reveal that addition of delayed comprehension score does not increase the predictability of academic success over that obtained from a combination of the other reading measures and OSPE score. The difference between the mean scores on immediate comprehension and delayed comprehension after 24 hours was significant at the .01 level.

CONCLUSIONS: Delayed comprehension is a relatively independent aspect of reading that can be measured as early as 24 hours after reading. While the delayed comprehension score did not increase predictability of academic success it should not be rejected. It is quite possible that the concept would be valuable in the diagnostic approach to reading skills and with further knowledge of delayed comprehension and its relationship to study methods, it is likely that this particular area could be taught as one of the higher-level study skills.

5:35. Allowing for individual differences in selecting training materials for a hierarchic skill.
LEONARD J. WEST, *AFPTRC*.

PROBLEM: The hierarchic theory as applied to typewriting learning posits an overlapping order of stroking habits which ranges from single-letter stroking to the handling of groups of letters or words in serial response fashion. This experiment investigated whether nonsense materials presumably aimed toward perfecting the lowest order of habits are preferable in initial stages to word and sentence materials presumably characteristic of later stages of training.

SUBJECTS: 345 Air Force enlisted men with no previous typing experience.

PROCEDURE: Subjects were divided into four groups, one for each of the following types of materials: (a) nonsense sequences (e.g., *frf, jujmj*, etc.), (b) sentences containing every letter of the alphabet, (c) discrete words of 2-8 letters in length (i.e., the alphabetic sentence materials in non-sentence order), and (d) discrete words of 3-5 letters in length. The entire alphabet appeared in every practice line. Each group of subjects used its particular materials for the first 65 minutes of practice. The last 55 minutes of practice used the same materials for all subjects: 15 minutes on cipher materials (e.g., *XIMCW JPCIE*, etc.) and 40 minutes on alphabetic sentences. Brief criterion tests were given periodically on alphabetic sentences and on cipher materials.

RESULTS: Groups 2, 3, and 4 were significantly faster on alphabetic sentence tests than Group 1. Differences in speed on cipher tests and in accuracy on alphabetic sentence tests were in the same direction, but, with a few exceptions, were not reliable.

CONCLUSIONS: For early typing training, nonsense sequences appear inferior to word and sentence materials. The latter may be superior because they permit adoption of a higher order of stroking habits when the learner is ready, whereas nonsense sequences keep the learner at the lowest stroking level and do not allow for individual differences in readiness to adopt more advanced modes of operation. Other possible factors which may account for results will be described.

Slides.

Psychologists of the Board of Missions, Methodist Church. Coffee Hour

3:50-4:50. Room 218, St. Francis

Division 16. Social Hour

3:50-5:50. Empire Room, Sir Francis Drake

Division 17. Symposium: The Counseling Psychologist and the Hospital Team

3:50-5:50. Concert Room, Sheraton Palace

JOHN W. GUSTAD, Chairman

Participants:

EILEEN S. CASSIDY. Social work.

JOHN HASKINS. Psychiatry.

J. ARTHUR WAITES. Clinical psychology.

JOHN PRUSMACK. Hospital management.

A. B. C. KNUDSEN. Physical medicine.

JERROLD D. SCOTT. Counseling psychology.

Division 20. Symposium: Approaches to the Study of Adult Personality: A Report on the Kansas City Study of Adult Life

3:50-5:50. Green Room, St. Francis

ROBERT J. HAVIGHURST, Chairman

Participants:

MARTIN B. LOEB. Some social factors in the study of aging.

ROBERT J. HAVIGHURST. Adult personality as a system of social roles.

BERNICE L. NEUGARTEN. The adult's implicit views of adult personality as differentially ascribed to age and sex.

WALTER F. GRUEN. The application of Erikson's psychosocial tasks to the study of adult personality.

WILLIAM E. HENRY. Affective complexity: A conceptual framework for the study of adult personality.

Discussant: ROBERT F. PECK.

Reception for APA Board of Directors, Council of Representatives and Committee Members, Division and State Association Officers

5:00. Room A, Sheraton Palace

FRIDAY EVENING, SEPTEMBER 2

Division 20. Dinner and Presidential Address

7:00. Room 220, St. Francis

OSCAR J. KAPLAN. *The Future of Gerontological Psychology.*

Division 12. Presidential Address and Business Meeting

7:30. Ballroom, Sheraton Palace

HAROLD M. HILDRETH. *Psychology and Organization.*

Division 8. Presidential Address, Business Meeting, and Reception for New Members

8:00. Empire Room, Sir Francis Drake

NEVITT SANFORD. *Surface and Depth in the Individual Personality.*

Division 16. New Executive Committee Meeting

8:00. Room 217, Sir Francis Drake

SATURDAY MORNING, SEPTEMBER 3

Executive Meeting of Education and Training Board

8:40-10:40. Room 2062, Sheraton Palace

GEORGE A. KELLY, Chairman

Board of Directors, International Council of Women Psychologists (first meeting)

8:40 A.M.-4:40 P.M. Room 221, Sir Francis Drake

Division 8. Communication

8:40-9:40. Lecture Room, U. of C. Extension Bldg.

HELEN PEAK, Chairman

8:40. The organization of communication in small problem-solving groups. EDGAR H. SCHEIN, SHELDON H. WHITE, AND WINIFRED F. HILL, *Army Medical Service Graduate School, Iowa Child Welfare Station.*

PURPOSE AND PROCEDURE: The purpose of the investigation was to determine what factors are related to the degree and type of spontaneous organization of communication in four-man fully-connected groups. Each group was restricted to an anonymous interchange of written messages on a common-number problem in which each member had to determine which of four digits in his possession was shared by all four men. The message exchange was restricted to steps in which each man could send only one message. The group task was to obtain the answer in the minimum number of steps or message exchanges (every group member had to submit the correct answer before a trial was finished).

Subjects could adopt one of several plans of exchanging messages, though none was necessary for an efficient solution of the problem. The degree of organization and the type of system used was studied when the group was given an arbitrarily assigned leader and when it was left leaderless, and under two conditions of instructions, creating a competitive and a cooperative situation.

SUBJECTS: Subjects were Army inductees and separates at a Reception and Reassignment Center.

RESULTS: Under cooperative instructions no significant differences were found in efficiency or degree of organization between "leader" and "leaderless" groups. However, the pattern utilized and the manner in which it evolved differed under the two conditions. Most organized groups tended to adopt a hierarchical centralized pattern rather than an equally or more efficient decentralized one. Competitive instructions decreased the efficiency of the groups somewhat and reduced the degree of organization markedly. How-

ever, those groups that organized still used a centralized system. The level of education of the group members affected the degree of organization and efficiency but the effect was different under different instructions and "leader" conditions.

Slides.

8:55. Group participation and informal status of source as determinants of spread of information in organizational groups. RICHARD SNYDER AND ELI SALTZ, *Human Research Unit No. 2 (CONARC), Fort Ord, California.*

PROBLEM: A field experiment investigated relationships between "spread of information" and two independent variables—(a) informal status of information source, and (b) extent of group participation in structuring the role occupied by the source. It was hypothesized that both independent variables would be positively related not only to amount but also to effectiveness of communication between source and potential recipients.

SUBJECTS AND PROCEDURE: Subjects were enlisted personnel in twelve military units of approximately 100 men each. From each unit three men were sent to observe an atomic explosion and to attend accompanying briefings. These observers constituted the information source. With independent variables dichotomized (high vs. low status, participation vs. no participation), the twelve groups were assigned in a fourfold experimental design. Status of source was manipulated by selecting observers on the basis of sociometric data. Group participation in structuring the observer role was achieved by providing group members with an explicit opportunity to discuss information needs and to prepare questions to be turned over to those selected as observers. Information level of all subjects was measured at the beginning and at the end of the experiment. Observer information was also measured immediately following the atomic test. At the conclusion of the experiment, reports of amount and "intensity" of communication were obtained, and sociometric instruments were readministered.

RESULTS: With respect to group participation, results confirm the major hypotheses. They also confirm a secondary hypothesis that gains in observers' informal status would be greater in participating than in non-participating groups. With respect to status of source, results showed only trends in the predicted direction. Results relating effectiveness of communication to participation are interpreted in the light of the finding that participation also resulted in significantly greater information gains by the observers. Theoretical, methodological, and practical implications of the experiment are discussed.

9:10. Communicating mental health information in community discussion groups. ELLIOTT McGINNIES AND CLAGETT SMITH, *University of Maryland.*

In accordance with the broader purposes of this research program, which are to evaluate the role of mental health films in community discussion groups, the present study undertook to compare opinion changes toward mental health concepts in groups which had viewed and discussed three films with groups that had seen the same films without subsequent discussion. Subjects in the study were 63 male and female members of four adult study groups in suburban Washington. Average size of the groups was 16.

A large number of statements concerning the nature, etiology, treatment, and prognosis of mental illness were adapted to a Likert-type scale. Through pretesting and item analysis, these were reduced to a 47-item inventory. This opinion inventory was administered to members of an experimental group that viewed and discussed each of three mental health films on different occasions. Another group viewed the same films without subsequent discussion, while a control group answered the questionnaire on two occasions without intervening treatment. The entire experiment was then replicated once with three additional groups. All discussions were tape recorded for later analysis.

Results of the study indicated that significant changes in opinions about mental health problems and concepts may be effected by either the film-discussion or film-alone techniques. The fact that the film-alone groups changed as much as the film-discussion groups was contrary to expectation and suggests that a related group discussion does not necessarily facilitate the effectiveness of a communication. Interpretation of the findings in terms of characteristics of the group members and content of the discussions will be attempted.

This research was conducted under a Special Grant from the National Institute of Mental Health.

Slides.

9:25. Communication for self versus communication for others in normals and schizophrenics. JOHN H. FLAVELL, *VA Hospital, Fort Lyon, Colorado.*

PROBLEM: It has been asserted that schizophrenics have particular difficulty in communicating to others because of a relative inability to take the role of their audience and govern their language organization accordingly. The present study investigated three hypotheses: (a) normals and schizophrenics will not differ significantly in the communicability of written

descriptions intended for self-communication only; (b) normals will significantly exceed schizophrenics in the communicability of descriptions explicitly written as communications to others; (c) corollary to (a) and (b), more normals than schizophrenics will manifest an increase in communicability when shifting from "self" descriptions to "others" descriptions.

SUBJECTS: Twenty normals and 24 schizophrenics, matched for education and verbal intelligence.

PROCEDURE: The subjects were first instructed to write one-sentence descriptions of four pen and ink designs, descriptions which were to serve the sole function of aiding them in remembering the appearance of the designs. Following this, the subjects were asked to write one-sentence descriptions which would enable others to recognize and identify these same designs.

RESULTS: Three judges were given all descriptions of one of the four designs and told to: (a) select the 22 "most communicable" and 22 "least communicable" of the 44 "self" descriptions; (b) do likewise with the 44 "others" descriptions; (c) select those protocols the "others" descriptions of which exceed the "self" descriptions in communicability. Chi-square analyses revealed no significant group difference in communicability of "self" descriptions, a significant difference ($p < .01$), favoring the normals, in communicability of "others" descriptions, and a near-significant difference ($.10 > p > .05$), again favoring the normals, in "self"—"others" increase in communicability. The following additional measure was employed as a possible technique in future communication studies. Four judges attempted to match each "others" description with its design. Hypothesis (a) was again confirmed ($p < .05$), as measured by group differences in number of correct matchings made.

Division 8. Emotional Factors and Social Perception

8:40-9:40. Empire Room, Sir Francis Drake

GEORGE S. KLEIN, Chairman

8:40. The application of aspects of Heider's theory to the study of the effect of perceived cooperation or competition. JOSEPH B. MARGOLIN, *Mental Health Study Center, National Institute of Mental Health*.

8:55. Effects of emotional arousal on retention of aggressive and nonaggressive movie content. ELEANOR E. MACCOBY, HARRY LEVIN, AND BRUCE M. SELVA, *Harvard University*.

PROBLEM: The hypothesis tested in this study is that the content which viewers retain after exposure to a motion-picture story will be a function of the viewer's emotional state at the time of exposure. Specifically, our predictions are that if the viewer is angry at the time of viewing, he will tend to recall (a) more of the aggressive material and (b) less of the non-aggressive material than viewers who are in a more neutral emotional state.

SUBJECTS: Five classes of fifth- and sixth-grade children (averaging 10 and 11 years old). Total cases: 127.

PROCEDURE: Each class was divided into two teams (matched for sex and intelligence) for a spelling bee. The "red" team were given difficult words to spell, at approximately the 9th grade level, and the "blue" team were given easy words, below the level of the class's current school performance. The members of the disadvantaged team protested that the contest was not fair, and were given a second chance, but the difference in word levels was maintained in the second spell-down. Immediately following the spelling bee, a chapter from a serial movie was shown, featuring the Dead-End Kids and the Junior G Men in a spy thriller. A week later, the children were tested on their recall of four kinds of content: (a) *central aggressive*, referring to the occurrence of overt aggressive acts, and the identity of the aggressor and the recipient; (b) *detailed aggressive*, referring to the details surrounding these aggressive acts; (c) *central neutral*; and (d) *detailed neutral*.

RESULTS: 1. The "red" team (those discriminated against in the spelling bee) recalled significantly more aggressive central content than the "blue" team. ($t = 6.3$, $p < .01$). 2. The "blue" team recalled significantly more neutral central, detailed neutral, and detailed aggressive material than did the "red" team. (t 's were 12.8, 21.0, and 25.1, respectively, with $p < .01$ in each case).

9:10. Psychodynamic implications of individual differences in expressive imitation. HOWARD SHEV- RIN, *The Menninger Foundation*.

In view of the importance given to identification in psychoanalytic and social psychological theory, surprisingly little attention has been given to the related process of imitation. Moreover, recent studies relating perception to personality suggest that more complex processes, such as imitation, may be found to reflect basic personality differences, thereby providing a link to dynamic conceptualizations. This paper is a report of some individual differences found in expressive imitation defined as the ability to reproduce the implicit, affective content of communications.

A sample of 48 college undergraduates, 24 men and 24 women, were required to imitate 20 Chinese phrases varying in emotional character and recorded by a native Chinese speaker. Three instructional sets were used, one for each subgroup of 8 men and 8 women: emotionally-oriented, intellectually-oriented, and neutral instructions. The subjects were also required to rate whether or not the phrases had emotional connotations for them (emotional receptivity). The California Psychological Inventory as well as a questionnaire expressly devised to gauge attitudes toward unconscious processes were used to collect personality data.

For the sample used it was found at suitable levels of statistical significance that (a) women were better imitators than men, (b) the emotionally-oriented instructions facilitated women's performance, while the intellectually-oriented instructions facilitated men's performance, (c) an accepting attitude toward unconscious processes and femininity were positively related to accuracy of imitation and emotional receptivity for women, and negatively related for men.

The results were discussed in the light of Hanfmann's dichotomy of "conceptual" and "perceptual" thinking, Witkin's notion of field dependent perception, and the Freudian view of preconscious activity in particular as developed by Kris. It was tentatively concluded that the differences found could be explained in terms of some critical balance between preconscious and conscious thought processes.

9:25. Social facilitation as a factor in reaction to humor. LESLIE F. MALPASS, *Southern Illinois University.*

PROBLEM: The purpose of the study was to investigate the facilitating effects of different social situations on reaction to humor. An additional objective was to determine if reaction to a particular type of humor is affected by the social situation in which it occurs.

SUBJECTS: 78 college subjects enrolled in three sophomore psychology classes.

PROCEDURES: Six judges identified 90 jokes and 90 cartoons (out of several hundred originally chosen) as representing essentially sexual, aggressive, or whimsical thematic material. Three joke and three cartoon tests were constructed, each consisting of equal numbers of stimuli representing the three humor types. Jokes were tape recorded and cartoons were projected on a screen to insure standard presentations to all subjects. The humor tests were presented to all subjects under three different conditions; in large groups of 24 to 30, in small groups of 6 or 7, and individually. Presentation conditions were varied with each class in order to cancel out group-set factors. Subjects rated each joke/cartoon on a

7-point scale, ranging from "One of the funniest jokes I ever heard" to "Not at all funny." Analysis of variance was used to determine (a) if the social situation (i.e. conditions of presentation) facilitated reaction to the humor stimuli, and (b) if there were significantly different reactions to the particular types of humor (i.e., sex, aggression, whimsy). *T* tests were computed to compare differences among the individual conditions of presentation and among individual humor types.

RESULTS: (a) Differences significant at the 1 per cent level were found in subjects' reactions to jokes, and at the 5 per cent level in reactions to cartoons, as a function of the social situation. Large and small group presentation of both jokes and cartoons tended to evoke more intense reactions than did individual presentation, although certain interesting exceptions occurred. (b) Differences at the 1 per cent level were found in subjects' reactions to the three types of humor used, both with respect to jokes and cartoons. Humor stimuli based on sex and aggression tended to evoke more intense reactions than did jokes and cartoons of a whimsical nature. A detailed analysis of the findings, comparing the separate presentation conditions and humor types, is available.

CONCLUSIONS: Reaction to humor is facilitated by the social situation in which the humor is presented. Reactions to a particular type of humor vary as a function of the social situation in which they occur.

Division 9. Symposium: The Interdependence of Mental Health, Social Attitudes, and Group Pathology.

8:40-10:40. Franciscan Room, Sir Francis Drake GOODWIN WATSON, Chairman

Participants: EVELYN HOOKER AND GEORGE R. BACH.

Division 12. Organic Illness

8:40-9:40. English Room, Sheraton Palace WILLIAM A. HUNT, Chairman

8:40. An investigation of some psychological factors related to results of subtotal gastrectomy. IRA W. WEINER. *Southern California Psychological Testing Service.*

An investigation was made of the relationship of some psychological factors to results of subtotal gastrectomy. The plan of the study was to test the following null hypotheses:

1. There is no significant difference in neuroticism between patients having successful subtotal gastrectomies and those having unsuccessful results.

2. There is no significant difference in manifest anxiety between successful and unsuccessful gastrectomy patients.

3. Individual MMPI test profiles cannot be sorted according to surgical result better than chance.

Twenty duodenal ulcer patients with successful results were compared with twenty patients having unsuccessful results. The surgical results were rated by explicit medical criteria. The two groups were roughly comparable in age, intelligence, and mean time of postsurgical evaluation. Both groups were given the group short form of the MMPI including the Taylor Scale of Manifest Anxiety from one to five years postoperatively at the time of surgical evaluation.

All three null hypotheses were rejected at the .01 level of confidence or better. Results indicated the unsuccessful group exhibited significantly more anxiety and also appeared significantly more neurotic than the successful group as measured by the "neurotic triad" of the MMPI. The magnitude of the latter difference was such that individual MMPI profiles were sorted correctly as to surgical result in approximately 87 per cent of the cases.

As postoperative data had been used, pre-post-surgery MMPI scale reliability coefficients were obtained on a control group of 14 gastrectomy patients. These coefficients were as high or higher than test-retest reliability figures reported in the literature. The pre-postsurgery mean profiles showed minimal changes. Considering the large magnitude of the difference found on the neurotic triad between the two experimental groups, the fairly high pre-postsurgery MMPI scale correlations together with clinical data on the dumping syndrome suggest it is probable similar results would have been obtained if preoperative data had been used.

8:55. Personality attributes related to bronchial asthma in the adult male. ALAN J. GLASSER, *Reiss-Davis Clinic for Child Guidance, Los Angeles.*

This paper reports an experimental investigation into the question of whether there exists a relationship between certain personality characteristics and a psychosomatic disorder—specifically, bronchial asthma. Perhaps the best known and most thorough psychological study of this disorder is the psychoanalytic investigation of Alexander and French, who found that the common factor in the 27 cases they studied was "basic insecurity" and "need for parental love and protection." They used no controls, nor was their data quantified. The purpose of the present study was to test their primary hypothesis, using two carefully matched groups of subjects and means permitting quantification of data.

The general hypothesis taken was: a psychological fact in the personality structure of the asthmatic is

a deep, unsatisfied dependency need. From this were logically deduced three specific hypotheses, predicting that a significantly greater number of reactions indicative of each of three personality attributes ((a) Dependency; (b) Confusion of Sexual Role; (c) Repression of Hostility) would be found in the group of asthmatics as compared to the control group.

Subjects were 25 adult male outpatient asthmatics with no other major medical or emotional problems, and 25 adult male employees of an industrial plant, free from asthma or other major medical or emotional difficulties.

Technique consisted of content analysis of the following tests: Rorschach, Thematic Apperception, and Phrase Association, using chi square as the basic statistic, since all distributions found were skewed.

The results tended to support all three specific hypotheses. A significantly greater number of reactions indicative of each of the three stated personality characteristics was elicited from the asthmatic group as compared to the control group (Dependency—chi square = 8.10, $p < .01$; Confusion of Sexual Role—chi square = 16.0, $p < .01$; Repression of Hostility—chi square = 3.92, $p < .05$). The general hypothesis of Alexander and French tended to be supported, bearing in mind the limitations set up by the compositions of the groups compared.

9:10. MMPI characteristics of hospitalized tuberculosis patients. BARBARA M. STEWART AND SHALOM E. VINEBERG, *VA Hospital, San Fernando, California.*

PROBLEM: To evaluate further personality differences, as indicated by the MMPI, between hospitalized tuberculosis and nontuberculosis patients. Previous studies have demonstrated (a) that chronically-ill hospitalized patients in general show elevated MMPI scores, (b) that TB patients show MMPI patterns different from those of other hospitalized groups, and (c) that TB patients differ in MMPI pattern from patients hospitalized in the same institution for other diseases. The present study compares profiles and item responses of TB patients with those of patients hospitalized for nontuberculous pulmonary diseases in the same institution. Here are two populations whose disease entities, though different, have the same locus, and who are being treated under similar conditions.

SUBJECTS: 442 TB patients (mean age 37) and 108 non-TB pulmonary disease patients (mean age 45)—all hospitalized male veterans.

PROCEDURE: The MMPI was administered to all subjects shortly after hospital admission, and mean standard scale scores for each group were compared.

After dividing the groups on an odd-even basis, cross-validation of item differences was performed.

RESULTS: Both groups of patients scored significantly higher than normals on each of the nine personality scales and on K. The non-TB patients obtained significantly higher scores than the TB group on Hypochondriasis and Hysteria, but these results were largely accounted for by the difference in mean age. Item comparisons yielded 10 items, after cross-validation, which significantly differentiated the groups. However, only two of the items appear to be clearly related to personality differences.

CONCLUSIONS: The results show that MMPI responses of this group of TB patients do not differ significantly from those of patients hospitalized for other pulmonary diseases. This finding may indicate either the rather uniform effects of similar hospital experience or the similarity of personality configurations associated with diseases involving the same body organs.

Slides.

9:25. An investigation of psychological and physiological factors related to rate of recovery in pulmonary tuberculosis. SANFORD BROTMAN, *Mira Loma Facility, Lancaster, California.*

This study had two major purposes: (a) to test a set of hypotheses concerning relationships between psychological factors and rate of recovery in tuberculosis; (b) to derive empirically and to validate a scale for predicting rate of recovery in tuberculosis.

The general hypothesis tested was that there are psychological differences between fast- and slow-recovering tuberculosis patients. The specific hypotheses were: (a) Patients who demonstrate a slow rate of recovery have more severe personality disturbances than patients who show a more rapid recovery; (b) slow-recovering patients have a higher degree of self-centeredness than rapid-recovering patients; (c) inappropriate emotional control is found more frequently in patients who show a slow rate of recovery than in those who recover more quickly.

Eighty-nine male, chronic pulmonary tuberculosis patients in a veteran's hospital constituted the experimental sample. All were ranked for rate of recovery (i.e., time to reach a particular point of disease stabilization), and the 30 upper and 30 lower were regarded as fast- and slow-recovery groups. They were compared on selected scales of the MMPI and selected physiological measures, all obtained as part of the routine hospital admission procedure. Two multiple regression equations were computed, based on obtained statistically significant differences in the basic data, including an experimental "Tuberculosis Slow Recovery" (Tsr) scale derived from an item

analysis of the MMPI. An additional sample of 29 patients was used to validate the equations.

Some support was obtained for the general and the first two specific hypotheses. Two statistically significant multiple correlations with rate of recovery were obtained using the following variables: Tsr scale and mean heart period; or Taylor Anxiety scale and heart period. The resultant equations failed, however, to predict rate of recovery in the validation sample.

Division 15. Symposium: The First Course in Educational Psychology

8:40-10:40. Italian Room, St. Francis

GERTRUDE H. HILDRETH, Chairman

Participants: SISTER MARY AMATORA, O.S.F., D. A. WORCESTER, ASAHEL D. WOODRUFF, AND ARTHUR P. COLARDARCI.

Division 16. Symposium: The Personality of the Teacher: Teacher-Pupil Relationships and Teacher-Psychologist Relationships

8:40-10:40. Auditorium, U. of C. Extension Bldg.

ESTHER LEE MIRMOW, Chairman

Participants:

MERLE H. ELLIOTT. The beginning teacher—his personality and his problems.

ROBERT N. BUSH. Case studies of teacher-pupil relationships in the classrooms.

CARROLL H. LEEDS. Teacher attitudes and temperament in teacher-pupil rapport.

JOHN C. GOWAN. The personality structure of successful teachers.

ELI M. BOWER. Changes in self, ideal-self relationships of teachers as a result of three educational experiences.

Division 16. Contributed papers

8:40-12:00. Monterey Room, Sir Francis Drake

GEORGE MEYER, Chairman

8:40. The application of clinical psychology to a school guidance program. BARNEY KATZ AND JOSEPHINE SAMMONS, *Guidance Department, Norwalk City Schools, Norwalk, California.*

This paper is concerned with the application of clinical psychology to a school guidance program during the past eight years. A consulting clinical psychologist, employed on a part-time basis, heads the clinic staff and deals with the more seriously disturbed students. He also conducts brief group therapy sessions with parents, leads teacher groups in discussions on psychological concepts, and participates with

school principals in discussions of group dynamics. His professional services are available to all administrators, teachers, and other school personnel.

In addition to the clinical psychologist, the guidance clinic is staffed with one full-time supervising counselor and six full-time counselors. One counselor is assigned to two schools. They work with the less disturbed students and devote a portion of their time to release therapy sessions. They also administer personality, projective, and intelligence tests.

The clinical psychologist spends the major portion of his time in brief therapy sessions with the parents of emotionally disturbed children. Therapy with parents consists primarily of directive interview sessions and bibliotherapy; therapy with children consists of brief directive interview sessions, release therapy sessions, and environmental control. Therapy sessions with parents are scheduled on an every-other-week basis for half-hour periods; therapy sessions with children are scheduled once a week for half-hour periods.

Clinical concepts and procedures have become an integral part of the Norwalk City School system. Teachers are more relaxed and students are more content. Discipline problems in the classroom have greatly decreased. Children are seldom intimidated or punished for misbehavior. Instead, constructive measures are initiated to help the student make a better personal, social, and school adjustment.

The success of this clinically-oriented guidance program should be an incentive for other school systems to organize their guidance program on the sound scientific principles and procedures of clinical psychology.

9:10. The interbehavioral viewpoint and the role of the school psychologist. VERDUN TRIONE, *Office of the Supt. of Schools, Mendocino County, California.*

This paper introduces a viewpoint which the writer refers to as objective, applied, and competent to deal with a psychological case from beginning to end. The role of the school psychologist is defined as one who must deal with the over-all nature of problems of human cooperation and development, i.e., the area of social skills.

The interbehavioral viewpoint is systematic, its language simple, thus making it more understandable to school personnel. In the area of abnormality, this viewpoint does not classify from symptoms such as psychiatry seeks, but rather in the reactional biography of the person.

Learning is referred to as contrived stimulus response coordination, not just sheer behavior acquisition. The various forms of stimulus response coordina-

tion are delineated. Education could use this approach. At present, education borrows from a rag-bag type datum representing a multitude of viewpoints. Not infrequently, confusion occurs.

This approach is referred to as "tough-minded" and deals with cases in terms of interbehavioral events rather than the traditional metaphysical, mind type construction. No reference is made to the many lists of instincts, drives, and basic needs which have prevailed in the early writings of psychologists.

A distinction is made with reference to the individual who seeks psychotherapy as opposed to other instances in which children are brought to clinics or guidance centers. In either case the school psychologist must consider the presence or absence of factors and the medium by which stimuli and responses are permitted. The school psychologist must not reduce data to the psychic, physiology, chemistry or numbers. His construct must be derived from the actual interbehavior of organisms with objects and events in specific situations.

This viewpoint affords a workable criterion of abnormality. Second, it affords a systematic approach to learning. Third, it provides a scientific approach, provides a safeguard against cultural influences, and promotes a powerful faith in events and a determination to understand traditional interferences with our investigation of them.

9:40. Criteria for vocational training of mentally retarded: A revised concept of the necessary mental level. HAROLD A. DELP, *The Training School at Vineland, New Jersey.*

PURPOSE: This paper presents an analysis of subjective and objective data on relationships of mental level and its components to various vocational training areas for mentally retarded individuals.

SUBJECTS: The subjects were approximately 200 students of The Training School at Vineland, New Jersey, who are in vocational training programs.

PROBLEM: The literature is very sparse on material concerning the levels of mental ability (MA or IQ) necessary to learn and to perform adequately on various occupational activities. Some articles quote mental levels from a few studies as indicative of training possibilities. Data are vague and indeterminate and limit any specific help to individuals or agencies faced with the problem of occupational counseling and training of mentally retarded. Added to this is the failure of numerous individuals assumed adequate for certain types of training.

PROCEDURE: The study includes an analysis of group data from all students in vocational training at the Training School, together with case studies for sub-

jects who showed wide differences between actual mental levels and those previously indicated as minimal for certain training areas. Analysis of individuals attempts to explain failures not previously expected.

SUMMARY: The summary describes criteria for vocational training in terms of mental level and its components, together with other factors apparently accounting for the wide range of MA's involved in satisfactory training for the same vocational areas. The fact of organic brain damage and related behavior is one not previously given much consideration in counseling but is found in this study to be important.

10:10. Personality factors related to over- and underachievement of college students. HELEN PROUTY, *San Diego State College*.

This study was undertaken to investigate whether there is a relationship between the degree to which use is made of their potentialities by students at different intellectual levels and their possession of differing amounts of the same personality variables.

Samples were selected from 502 women enrolled in the University of California during 1950. Scores on the American Council on Education Psychological Examination were used as measures of mental ability and the averages of four semester honor-point ratios as indices of academic achievement. From the original population, reduced to a homogeneity of age and upper-division status, samples of high, mid, and low ability were taken; and, at each of these ability levels, a sample of forty was selected from either end of the ability continuum.

To make statistical comparisons an item analysis was made of responses to the Minnesota Multiphasic Personality Inventory, the Johnson Temperament Analysis, and the Tyler Test of Initiative, and total scores were computed on the Carter Study Methods Test. Subjective clusters of the significant items were then formulated making the following conclusions seem justified:

An increase in mental ability tends to be accompanied by more self-confidence, religious skepticism, and introvertive tendencies; fewer worries and somatic complaints; less social skill and ability to accept criticism; greater tolerance; higher ethical principles; broader interests; and a greater enjoyment of reading.

Overachievers tend to differ from underachievers in freedom from worries and somatic complaints, overvaluation of self, lack of social conformity, and indifference to social responsibilities. They have more religious skepticism, initiative, perseverance, self-control, dominance, social skill, and extrovertive tendencies.

Items uniquely significant to each of the six samples indicate that different personality factors do accompany different levels of ability and degrees of achievement. Greater and more numerous differences were found to distinguish the high-ability overachievers than any other sample.

10:40. A university reading-improvement program: An experimental study with some hypotheses related to reading problems. HELENE POWNER MANN, *Tulane University*.

PROBLEM: To determine measurable and nonmeasurable results in a college reading program of 12 sessions conducted with psychotherapeutic techniques.

SUBJECTS: One hundred college students who enrolled in a voluntary course in the improvement of reading.

PROCEDURE: Students in groups were given assistance in reading, study habits, and in meeting their problems. Each student was dealt with individually within time limits of class periods and short conferences. Alternate forms of the Iowa Silent Reading Test were administered at the first and twelfth meetings. Records of conferences supplemented tests.

RESULTS: Over-all gains between first and twelfth meetings averaged 11 to 16 standard points according to groups. Approximately the same gains occurred in rate as in comprehension.

The nonmeasurable results are considered of more importance than the measured results: A marked gain was noted in self-confidence or in "courage" on the part of the students who also made gains. It is not possible to measure these advantages, but they appeared to be somewhat in proportion to measurable gains. Reading problems provided a cross-section of the individual's general behavior. Students gained most in reading who appeared to gain most in self-observation, provided they were able to translate their observations into appropriate action.

CONCLUSIONS: This study demonstrates that, as far as the reading process is concerned, long courses are not necessary for populations similar to ours, but that short intensive courses, conducted with psychotherapeutic techniques, can lead to measurable results which are as good as or better than some courses lasting a semester. Gains at the college level of a comparable population are believed to be in part a function of group psychotherapy supplemented by short conferences directed towards individual problems of which reading is a by-product. Reading problems are symptoms of more fundamental problems. Treating symptoms of any kind must be questioned. Fundamental issues are discussed, leading to hypotheses with respect to perception and learning with reading as an example.

11:10. The self concepts of bright boys with learning difficulties. ANN M. WALSH, *Teachers College, Columbia University*. (Sponsor, Gertrude P. Driscoll)

PROBLEM: To demonstrate the relationship between the self concepts and school achievement of bright boys with learning difficulties, through a study of their projective doll play.

SUBJECTS: Twenty low-achieving boys, aged seven through eleven, with IQ's from 120 to 146, were individually matched with twenty adequate achievers with regard to age, grade, intelligence, race and socio-economic status.

HYPOTHESES: It was hypothesized that doll play of the low achievers would less frequently depict the boy doll as: (a) free to pursue his own interests; (b) free to express his emotions; (c) accepted by his family; (d) adequate in responding to environmental stimuli; (e) able to identify with the male sex role.

PROCEDURE: The Driscoll Playkit was administered to each subject. Verbally and through manipulation of the dolls, each subject was asked to finish ten incomplete stories. Responses were electrically recorded and were transcribed verbatim. They were analyzed according to five categories corresponding to the five hypotheses.

RESULTS: The low achievers consistently differed from the adequate achievers in portraying the boy doll as restricted in action; unable to express his feelings appropriately and adequately; being criticized, rejected or isolated; and acting defensively, through compliance, evasion or negativism. The *t* test demonstrated that these differences were significant beyond the .01 level. The fifth hypothesis regarding sex identification did not discriminate between groups.

CONCLUSIONS: The results of this study lend weight to the theory that low achievers see themselves as inadequate in four of the ways hypothesized.

Division 17. Personality Studies

8:40-9:40. California Room, Sheraton Palace

HUGH M. BELL, Chairman

8:40. Factors in parents' prediction of adolescent responses to selected items on the Bell Adjustment Inventory, MARGARET S. JESSEN, *Woodland, California, Public Schools*.

Sixty-four parents were administered the student form of the Bell Adjustment Inventory which had previously been administered to their fifty adolescent children. The parents were asked to answer the questions as they felt their child would. Thirty-eight items were selected independently by four judges as being important in intrafamily relationships. The reliability coefficient among the four ratings was .97.

The chi-square test applied to these questions showed twelve items predicted accurately by the parents at or above the .05 level of confidence. The analysis of areas of agreement and disagreement between self-concepts and predictions attempted (a) to focus on the questions on which parents accurately predicted; and (b) to point out the questions for which the parents seemed unable to predict the answers of their child. The parents tended to overestimate the child in thirteen of the thirty-eight questions. By overestimation is meant the tendency to answer "No" for the child, when the student had actually answered "Yes." Conversely, on twenty-five items the parents tended to underestimate the student. This was especially true of questions involving personal relationships between student and parent. Those parents designated as the best predictors have accurately predicted each of these thirty-eight items while parents described as the poorest predictors missed all of these items. The parents predicting most accurately also showed the best social and emotional adjustment as measured by their own scores on the adult form of the Bell Inventory. The criterion which most definitely determines the degree of parental understanding as reflected by the parent's ability to predict for his child on the Bell, then, would seem to be his own emotional adjustment score.

8:55. The role of personality factors in vocational choice. STANLEY J. SEGAL, *University of Michigan*.

In this study an attempt has been made to apply psychoanalytic theory to the vocational choices of accounting and creative writing, in order to clarify the role of personality in an individual's choice of an occupation.

A battery of projective tests was administered to creative writing students and accounting students. These groups were selected on the basis of their enrollment in specific curricula, and on their scores on the Accounting key of the Strong Vocational Interest Blank.

Specific psychoanalytic concepts were considered with regard to their meaning in an individual's vocational choice. These concepts were related to information about the two occupations, derived from general cultural stereotypes and interest tests. Dynamic developmental sketches of individuals who would enter each occupation were formulated, from which a series of hypotheses were derived. These were tested on the basis of specific predictions based on the test battery, the criterion for acceptance of each hypothesis being the significance of all tests relevant to it.

The findings are: 1. Accounting students and writing students did not differ in general adjustment

level. 2. It is doubtful that accounting students show greater acceptance of social norms than writing students. 3. Accounting students show greater attempts at emotional control, whereas writing students show greater awareness of feelings. 4. There were no differences in the use of compulsive defenses. 5. Writing students showed greater evidence of expressions of hostility. 6. Writing students showed greater tolerance for ambiguity and greater ability to deal with complex emotional situations. 7. There were greater signs of a more rigid fearful identification in accounting students and greater evidence of seeking for completion of multiple identifications in writing students.

The findings validate the idea that personality theory can lead to a more complete understanding of the role of personality factors as determinants of vocational choice.

9:10. A study of the interest profile of a psychotic group and its bearing on interest-personality theory. SAMUEL F. KLUGMAN, VA Hospital, Coatesville, Pennsylvania.

PURPOSE: The aim of this investigation was to study the interest profile of a psychotic group and, by a comparison with those of normal and neurotic populations, relate the findings to interest-personality theory.

SUBJECTS: The subjects were 100 patients in partial remission at a VA hospital to whom the Kuder Preference Record, Form BB, had been administered during the course of their vocational counseling.

PROCEDURE: The obtained means of the various interest areas were compared with those earned by Steinberg's neurotics and Kuder's assumedly normal Base Group.

RESULTS: Steinberg, comparing his results with Kuder's base group, found a unique profile for neurotics "characterized by low Mechanical and Scientific interests and high Literary and Musical interests" which he claimed was due to a disturbed relation to reality and a tendency to emphasize fantasy rather than practical performance. The present results on psychotics, however, show a strong resemblance to the various area means found in Kuder's base group, since no significant differences, except for Mechanical interests, were obtained between the two groups.

CONCLUSIONS: If Steinberg's obtained profile is truly characteristic, then our findings have important theoretical meaning. They imply that institutionalized psychotic patients in remission are in better contact with reality and engage in less wish-fulfilling fantasy behavior than out-patient neurotics. These findings, therefore, emphasize the need for a crucial study of Steinberg's psychoanalytically oriented hypothesis. If upheld, an interest profile will indeed be a means for alerting "a vocational counselor to adjustment prob-

lems" (Steinberg). If refuted, then Cottle's contention of no relationship between interest and personality appears upheld by our data.

In view of the lack of significant differences between the psychotic and normal groups, it would seem that counseling psychologists when working with patients in remission may place a high degree of confidence in their obtained interest inventory results. Slides.

9:25. Relation of the Edwards Personal Preference Schedule to the clinical and experimental scales of the MMPI. REED M. MERRILL, Guidance Center, University of Utah.

In order to clarify the meaning of scores on the Edwards Personal Preference Schedule, tetrachoric correlations were computed between the 15 variables of the PPS and the validating, clinical (with and without *K* correction), and experimental scales of the MMPI. The MMPI experimental scales used were Gough's Dominance, Responsibility, and Status Scales, Drake's S-I Scale, Taylor's Manifest Anxiety Scale, Navran's Dependency Scale, and Edwards' Social Desirability Scale.

Subjects were 155 male clients seen at a college guidance center. All available cases were used with the exception of those subjects who had less than a minimal degree of consistency on the duplicate items of either of the two tests. Both tests were taken as part of a test battery for vocational or educational counseling.

In general, for this fairly normal sample of subjects, correlations with the experimental scales were higher than those with the clinical scales. The use of *K*-corrected scores did not affect very significantly the obtained correlations. The implications of the data for student counseling are discussed.

Slides.

Division 18. Round Table: Psychopathic Personality in Correctional Institutions

8:40-10:40. Room 220, St. Francis

WILLIAM R. PERL, Chairman

Participants: J. DOUGLAS GRANT, SHELDON B. PEIZER, AND DOROTHY BARUCH.

Division 18. Group Discussion: Theory and Applications of the J-Coefficient for Selecting Tests

8:40-10:40. Room 210, St. Francis

THOMAS E. BARRY, Moderator

Participants: ROGER BELLows, ERNEST S. PRIMOFF, WILLIAM JASPER, EDNA Y. HAYNES, HOWARD J. HAUSMAN, CHARLES G. BOTSFORD, WILLIAM A. BIEHLER, AND JOSEPH SAMLER.

Films. Miscellaneous

9:00-12:00. Colonial Room, St. Francis
 9:00. Corral. NATIONAL FILM BOARD OF CANADA.
 9:19. A family affair. MENTAL HEALTH FILM BOARD.
 9:54. Parents are people too. McGRAW-HILL TEXTFILMS.
 10:12. Men at work. McGRAW-HILL TEXTFILMS.
 10:37. Rumor. CENTER FOR MASS COMMUNICATION.
 10:49. Can we immunize against prejudice? CENTER FOR MASS COMMUNICATION.

Division 14. Workshop. Section I, Critical Issues in Executive Appraisal and Development (Discussion Leader, MILTON L. BLUM); Section II, The Industrial Psychologist Prepares for the Age of Automation (Discussion Leader, JEROME H. ELY); Section III, The Industrial Psychologist Faces Management (Discussion Leader, C. H. LAWSHE).

9:00 A.M.-8:00 P.M. Bellevue

IRVING R. WESCHLER, Chairman

Participants: RALPH CANTER AND RAYMOND A. KATZELL
 (Preregistration and payment of fee required.)

Open Meeting on "Interprofessional Problems of Psychiatry and Psychology"

9:50-12:00. Comstock Room, Sheraton Palace
 JOHN G. DARLEY AND PAUL HUSTON, Co-Chairmen

Conference of State Psychological Associations. Discussion Sessions

9:50-12:00.

I. The Nature and Function of State Associations. Room 214, Sir Francis Drake
 Topic Chairman: CLARENCE L. WINDER
 II. APA and State Association Relationships. Parlor B, Sir Francis Drake
 Topic Chairman: HUGH C. BLODGETT
 III. Intrastate Association Problems. Room 217, Sir Francis Drake
 Topic Chairman: HILDING B. CARLSON
 IV. State Associations and Problems of Legislation. Room 210, Sir Francis Drake
 Topic Chairman: RUTH J. LEVY

Division 8. Social Norms

9:50-10:50. Lecture Room, U. of C. Extension Bldg.

JOHN H. ROHRER, Chairman

9:50. The choice of reference groups on social issues. JAMES M. SHIPTON, *Harvard University*. (Sponsor, J. S. Bruner)

PROBLEM: To determine attitudinal correlates of choice of positive and negative, membership and nonmembership, primary and secondary reference groups on social issues.

SUBJECTS: Random sample of 902 adults in an industrial city of 45,000 residents.

PROCEDURE: Respondents in a two-wave panel study were shown a standard list of 24 types of potential reference groups and were asked to designate their reference groups on hypothetical issues regarding local schools. Data were also collected on several attitude dimensions hypothesized, on the basis of previous theory and research, to be relevant to the designation of types or number of reference groups. Latent Distance Scales were constructed for these attitude dimensions.

RESULTS: Both number and types of reference groups designated were related, in the hypothesized directions, to the attitude dimensions represented by the Latent Distance Scales: 1. "Inner-directed" respondents chose fewer positive reference groups than did "other-directed" respondents. 2. "Intolerance of ambiguity" was associated with the rejection of non-membership religious groups as reference groups. 3. "Anomie," as measured by an adaptation of Srole's scale, was strongly related to choice of membership religious groups, but was related to rejection of non-membership religious groups only among relatively highly educated Protestants. 4. Among men, "achievement orientation" was positively related to choice of high-status occupational leaders as positive reference groups, and was negatively related to choice of primary groups as positive reference groups.

CONCLUSIONS: Choice and rejection of reference groups in a given content area, such as issues over schools, may be predicted by attitude variables suggested by general theory which was derived without reference to the given content area. As a result, theories of ethnic prejudice or of achievement motivation, for example, may be extended considerably by survey research upon reference groups on diverse social issues.

10:05. Consistency of attitudinal response under group influence. PHILIP J. RUNKEL, *University of Michigan*. (Sponsor, Theodore M. Newcomb)

The hypothesis was tested that individuals will become more consistent in their responses to replicated attitude items as a result of cognitive adjustment to group influence. This hypothesis follows from the argument that communication with significant others leads to increased differentiation or clarity of cognitive structures, as in Krech and Crutchfield. It is suggested by such work as that of V. V. French on the structure of sentiments, 1947, and that of R. Glaser on the reliability of inconsistency, 1952.

College students were observed in three separate studies. Subjects were presented with attitude questionnaires in which statements were presented in triads, one statement appearing in more than one triad, in a data-collection procedure described by C. H. Coombs. Pairs of statements therefore appeared more than once, and a consistency measure was obtained by counting the percentage of pairs in which the subject consistently preferred one statement in the pair.

It was found that individuals who agreed with a norm established in the society at large were significantly more consistent than those who did not. It was also found that individuals whose response attributes were those of the modal group showed significantly higher consistency than those who responded on nontypical attributes, regardless of the individual's attitude position. Further, groups in which attitudes were subjected to experimental influence became significantly higher in consistency than a control group. And finally, consistency computed from responses over a series of different influence attempts was significantly lower than on a posttest given after the cessation of influence attempts.

It is concluded that the hypothesis is supported, that consistency offers a convenient index of clarity in a cognitive structure, and that the Method of Triads is a convenient and effective way of obtaining the measure.

10:20. Biosocial constancy of urban social areas.

ROBERT C. TRYON, *University of California.*

People in the neighborhoods of the San Francisco Bay area were found in 1940 to cluster into 18 different kinds of social areas. Do these subcultural groups remain distinctive types in spite of a great influx of newcomers and home-changing of inhabitants?

The social areas of 1940 were distinguished by contrasting profiles of scores on three social dimensions, F-Family Life, A-Assimilation, and S-Socioeconomic Independence. They differed equally as much in voting behavior. The social dimensions

were derived from a cluster analysis of 33 biosocial census characteristics.

Revised FAS "norms" have now been derived from the new 1950 census, the 1940 FAS scores of the neighborhoods (census tracts) expressed in 1950 norms and compared with their 1950 values.

In F-Family Life the relative standing of the neighborhoods in 1940 compared with that in 1950 was almost identical, as indicated by a correlation of .98. In short, each neighborhood preserved its own kind of orientation around the family despite great social upheaval and migration. In one year alone, 1949 to 1950, one out of five persons in the average neighborhood was found to be a new resident. If this turn-over rate occurred in each of the 10 years from 1940 to 1950, then only one out of 10 persons living in a given neighborhood in 1950 would have been there in 1940. The neighborhoods were also constant in their relative standing in Assimilation and Socio-economic Independence. The social area groupings of neighborhoods have thus remained constant.

The conclusion is that social areas represent biosocial types of persons, and that the differences between them are relatively unaffected by the particular persons who move in or out. Since these biosocial types are easily identified and located in any tracted city by their FAS profile, they are readily available for intensive study.

10:35. The influence of social factors on group conformity in normal and abnormal personalities: A study of perception of unstable stimuli and norm formation. S. VINCENT DIDATO, *Loyola University of Chicago.*

Research by F. H. Allport, S. Asch, K. Lewin, and M. Sherif on the phenomena of group conformity and attitude formation, reveals many interesting findings with many theoretical implications regarding the socialization process in man. In all of these experiments, "normal" subjects were used. The hypothesis held by many (especially neo-Freudians) that the symptoms of the emotionally disturbed stem from, and are then re-expressed in, difficulties in social interaction, is well-known. However, very few studies have explored this hypothesis experimentally. One experiment (by Levine *et al.*, 1954) attempted to study group conformity and attitude formation with psychiatric patients and, although the sample was small (7 neurotics), results showed that significant differences occurred in the degree of conformity within the group, and in the adoption of group norms between neurotics and controls.

PROBLEM: To determine whether the emotionally disturbed individual will: (a) respond to social interaction by judging an indefinite stimulus in terms of

an experimentally induced norm, and (b) accept and integrate this norm into his own judgmental perceptions.

The specific hypothesis to be tested is as follows: The emotionally distressed individual will not be influenced by, or respond to, social stimulation around him which endeavors to inculcate in him a judgmental frame of reference.

SUBJECTS, PROCEDURE, AND RESULTS: Thirty-two schizophrenics, chosen on the basis of recency of illness and rapport, and 32 normals, equated as to age and sex, made judgments regarding a highly unstable stimulus situation (autokinetic phenomenon). They were tested individually and in groups. Variance analysis showed the convergence phenomenon to occur pronouncedly with the normals. When subjects in whom norms and ranges were first developed in individual situations were placed in a group situation in which anchorages were suggested by some members, they readily adopted the standards of the group. The schizophrenics showed no such convergence with group standards, after having once established their norms and ranges in the previous individual situation. Some exceptions occurred when the patients were taken first in groups, then individually.

CONCLUSIONS: The psychologically distressed person fails to respond to the social stimulation of the group of which he is a member. Once formed, his frame of reference is unaffected by the impact of social interaction around him.

Division 8. Symposium: Attitudes and Adjustment in Cross-Cultural Contact: Recent Studies of Foreign Students

9:50-12:00. Empire Room, Sir Francis Drake

M. BREWSTER SMITH, Chairman

Participants:

M. BREWSTER SMITH. Cross-cultural education as a research area.

OLUF DAVIDSEN (with WILLIAM H. SEWELL and RICHARD T. MORRIS). The adjustment of Scandinavian students.

RICHARD T. MORRIS (with OLUF DAVIDSEN). National and personal status as factors influencing the perceptions and attitudes of foreign students.

STUART W. COOK (with ANNA LEE HOPSON and CLAIRE SELTZER). The effects of different types of educational institutions on the outcomes of foreign study.

Discussants: DAVID G. MANDELBAUM AND BERNARD J. SIEGEL.

Division 12. Therapy II

9:50-10:50. English Room, Sheraton Palace

VICTOR C. RAIMY, Chairman

9:50. An experimental investigation of a conditioning treatment and a preliminary study of the psychoanalytic theory of the etiology of nocturnal enuresis. MURRAY KAHANE, *National Institute of Mental Health, U. S. Public Health Service, University of California, Los Angeles*.

PROBLEM: Mowrer and others uniformly report success with a conditioning treatment for nocturnal enuresis; however, no controls were used. This study's purpose was: (a) to investigate experimentally these findings and treatment effects on behavior (e.g., symptom substitution); (b) to test preliminarily, with the Blacky Pictures, several psychoanalytically deduced hypotheses concerning the etiology of nocturnal enuresis.

SUBJECTS: 59 enuretics participated in the conditioning experiment. Twenty-three enuretics and 14 non-enuretics participated in the test of the psychoanalytic hypotheses.

PROCEDURE: Patients were examined medically. Subsequently, mother and child received individual explanatory and reassuring sessions concerning bedwetting. With each child's consent, the Experimental Group received a conditioning apparatus which caused awakening following urination onset. Control Group I was treated identically, except patients waited several months before receiving the apparatus. To evaluate the effects of patient-investigator relationship, Control Group II received only the pediatric examination and was placed on a treatment waiting list.

The investigator administered and scored the Blacky Pictures. Parental report was the criterion for behavioral change.

RESULTS: All 21 experimental subjects were dry for at least one month following treatment; however, 13 patients relapsed from one to seven months following conditioning. With one exception, 10 of 22 subjects in Control Group I stopped bedwetting within a month following last clinic contact and one relapsed. Two of 16 subjects in Control Group II ceased bedwetting. Behavioral improvement related significantly to symptom remission only in control groups. Symptom substitution evidence was minimal.

CONCLUSIONS: (a) Omission of control procedures accounts for discrepancy between these findings and those of other investigators; (b) habit deficiency is not a heuristic concept for enuresis; (c) behavioral improvement following symptom remission appears most likely without direct symptom manipulation; (d) either the Blacky Pictures are inadequate, or

psychoanalytic assumptions regarding enuresis apply specifically rather than generally.
Slides.

10:05. A study in prediction of attitudes of patients toward brief psychotherapy. **SHIRLEY HECHT AND THEODORE C. KROEBER**, *University of California*.

Predictions were made of posttherapy patient attitudes towards their psychotherapist and psychotherapy, as expressed in a posttherapy questionnaire. One hundred and twenty-five former patients of the psychiatric clinic of the Student Health Service were selected from students seen during one school year.

A random choice was made of 25 students from each of five subgroups selected from the number of times seen at the Clinic (one to twenty plus).

Ratings of questionnaires for (a) expressed attitude toward therapist and (b) expressed satisfaction with therapy gave interrater reliabilities of above .90. Predictions of these ratings were made from the MMPI and initial interview summaries. Interrater reliabilities were statistically significant at the .01 level for both MMPI and initial interview ratings.

Prediction correlations of (a) expressed attitudes toward therapists with criterion questionnaire ratings were .48 (MMPI), .57 (initial interview); (b) expressed satisfaction with therapy .51 (initial interview). Prediction (from initial interview) of number of times seen correlated with actual number of times seen .62.

High correlations (.85) between criterion ratings and prediction ratings may reflect both "halo" and a real interrelationship between attitude toward therapist and satisfaction with therapy. An analysis of prediction errors is made in this connection.

The data suggest that it is possible to identify clinically recognizable patterns from which behavior can be predicted.

10:20. A phenomenological hypothesis of neurotic determinants and their therapy. **J. F. T. BUGENTAL**, *Psychological Service Associates, Los Angeles*.

Neophenomenology postulates that all behavior is determined by and pertinent to the phenomenological field of the behaver. This field is the product of the situation of the moment and of the self-and-world concept of the behaver. The self-and-world concept, in turn, arises from *primary* experiences of the individual and from *secondary* learnings from the attitudes of other persons significant to him.

The self-and-world concept is crucial in the individual's relations with reality. Incoming experience is

either accepted, since it conforms to the self-and-world concept, or it forms the basis for adjustment in the concept, or neurotic defense mechanisms. Since the self-and-world concept is the actual (phenomenological) world of the individual, it is his only guide to the satisfaction of needs or the avoidance of harm. To the extent that the concept is not congruent with reality, the individual behaves inefficiently and experiences anxiety.

The secondary perceptions of the self and the world which constitute an important part of the individual's self-and-world concept include some perceptions which are fallacious but which importantly contribute to anxiety and neurosis, e.g., "There is something wrong with a person who does not love his mother." Therapeutic approaches which try to analyze such perceptions as though they were of primary derivation (significant personal experience) are apt to be unduly prolonged and cumbersome. Those which wait for the patient to come to recognition of the fallacies of his own accord seem to be needlessly wasteful. Bibliotherapy and mental hygiene lectures may prove useful for the more educated patients but probably not fully so even with them.

Many therapists have evolved informal procedures for dealing with such fallacious perceptions; however, discussion and research is needed to refine these procedures.

10:35. Success in psychotherapy as a function of certain actuarial variables. **DESMOND S. CARTWRIGHT**, *University of Chicago*.

PROBLEM: Is rated success in psychotherapy related to age, sex, student vs. nonstudent status, or length of therapy of clients in client-centered psychotherapy? **SUBJECTS:** 78 clients attending the Counseling Center, University of Chicago.

PROCEDURE: Reliability and validity of a 9-point rating scale of success in therapy were established. The interrelations between success rating and the four actuarial variables were examined by correlational and other procedures.

RESULTS: Neither sex nor age (18-43 years) are related to success. Students are somewhat more successful than nonstudents, but the reasons for this difference cannot be established on the basis of the present data. The relation between length of therapy and success is complex, with the total sample falling into two groups on the basis of this relation. One group is composed of short cases; the other of long cases. Within each group there is a strong positive relation between number of interviews and success rating. Between the two groups a "failure zone" is established as ranging from 13 to 21 interviews. The mean

success rating of 10 clients falling in this zone is significantly different from that of the group just prior to it, and also from that of the group just subsequent to the "failure zone" ($p < .01$). The presence of this zone is not due to particular therapists.

CONCLUSIONS: There are two kinds of therapeutic process, dependent upon individual differences in clients. It is hypothesized that those who have mainly situational problems are likely to have short therapy; while those who have mainly personality problems are likely to have long therapy. The interpretation is made that the "failure zone" is a period during which potentially long-case clients drop out of therapy as a result of inability to tolerate the level of anxiety which is aroused or anticipated.

Division 12. General Clinical

9:50-10:50. Room A, Sheraton Palace

GEORGENE H. SEWARD, Chairman

9:50. Life history interviews with 100 normal American males: "Pathogenicity" of childhood. HAROLD RENAUD AND FLOYD ESTESS, *Institute of Personality Assessment and Research, University of California, Berkeley.*

Most students of behavior would agree that critical tests of hypotheses concerning the development of mental illness can only be made through the study of normal control groups. Stated most simply, the significant question is whether or not large numbers of mentally healthy persons have "pathogenic" childhoods. That is, do the histories of adequately functioning symptom-free normals contain less evidence of "traumatic" events (parental rejection, parental discord, conflict with siblings, rigid training patterns, repressive sexual attitudes, and oedipal anxieties) than do the histories of "patients" (persons who seek our professional help with neurotic or psychotic symptoms) ?

Two clinicians experienced in life history interviewing gathered data in all major institutional areas such as home, family, occupation, religion, politics, etc., from 100 men whose functioning could be described as distinctly above normal by all ordinary standards. Findings from these interviews are reported because they have bearing on the broad theoretical question stated above, and because the findings are themselves of clinical interest since incidence figures on psychoses and neuroses in a group selected for normality were obtained.

The interviewing was done as one part of a broad over-all assessment program on these subjects. Indices of agreement, based on independent Q sorts,

are available between the two interviewers, as well as between each interviewer and the composite Q sort of the combined assessment staff.

A resumé of the Childhood History, and Contemporary Life Adjustment of the group is given. The conclusion is reached that although these men functioned adequately, and were in general symptom-free, their reported childhoods contained as many traumatic events, and "pathogenic" factors as are ordinarily elicited in interviews with many psychiatric patients.

Past and present concepts of "ego strength" are examined with respect to their adequacy in accounting for these findings.

10:05. The influence of social desirability on three personality evaluation techniques. DOUGLAS T. KENNY, *University of British Columbia.*

PURPOSE: To investigate the relationship between social desirability and the probability of endorsement of self-concept traits on three different personality evaluation approaches. Expectations were that social desirability would manifest a greater effect on personality questionnaire items and rating scales than on Q sorts.

SUBJECTS AND PROCEDURE: Under conditions of anonymity, 198 university students served as subjects. Of these, 67 subjects rated 25 self-concept traits for their social desirability, 65 subjects answered 25 questionnaire items containing the same personal traits, 58 subjects rated the items for real and ideal selves on a 7-point rating scale, and 8 subjects performed real-self, ideal-self, and social-desirability Q sorts. The 25 traits had been employed by Zimmer in his study on self-acceptance and its relation to conflict.

RESULTS: The rank-order correlations between social desirability and the personality questionnaire items, real-self rating scale and ideal-self rating scale items were .82, .81, and .82, respectively. Composite summed Q sorts for real self and ideal self correlated with social desirability to the extent of .81 and .86, respectively. While 5 of the 8 individual real-self Q sorts agreed significantly with a person's own personal conception of social desirability, 7 of the 8 real-self Q sorts related significantly to the independent group's conception of social desirability. A similar comparison with the individual ideal-self Q sorts revealed highly similar results.

CONCLUSIONS: These results offer strong support to Edwards' finding of an extremely high relationship between probability of endorsement of a personality item and social desirability. The influence of social desirability is essentially the same on all three per-

sonality evaluation techniques. The implications of these findings for studies that test the hypothesis that discrepancies between real self and ideal self reflect maladjustment will be discussed.

10:20. Social values and psychotherapy. RICHARD JESSOR, *University of Colorado*.

While problems of professional ethics and of technique in psychotherapy have received much attention from clinical psychologists, almost none has been given to value judgments involved in carrying on treatment. The main points of this paper are that value judgments or positions are inescapable in psychotherapeutic practice; that such judgments have been largely implicit; that they are based upon a relatively narrow conception of adjusted behavior; and that a major goal of psychotherapy should involve social change.

The first question involving a value decision for psychologists is whether to do therapy, or to intervene in the "natural" course of events. Few therapists are overtly troubled by this question and can point to other interventions in our culture such as education. It is contended, however, that assumption of a passive therapeutic role may represent an attempt to avoid making this decision.

The more difficult value decisions relate to the direction which therapy should take, or the goals of therapy. All therapists make choices of direction; if such choices are not explicit, they are implicitly contained in the theoretical framework underlying the therapy. Nearly all psychotherapeutic approaches incorporate one or both of the following general goals: reduction or elimination of inner tension, and conformity with society.

Both of these goals are examined with respect to their social implications. The former disregards the social basis and interpersonal nature of maladjustment. The latter may involve maintenance of the status quo or express the values of a single segment of society, generally the middle class.

A third goal is suggested for psychotherapy—social contributiveness. Difficulties with such a value orientation are discussed, but it is argued that both the development of a broad, cooperative, social philosophy, and active participation in changing his social milieu can be essential directions for the patient in successful psychotherapy.

10:35. A qualitative and quantitative analysis of dream imagery. ERNEST BELDEN, *Napa State Hospital, Imola, California*.

The present investigation constitutes an attempt to meet one phase of the need for more systematic dream

research as pointed out by Ramsey in a recent article in the *Psychological Bulletin*.

The responses of neurotics, psychotics, psychopaths, and normal males were compared on a dream questionnaire. Four corresponding scales were constructed on the basis of an item analysis. A short validation study yielded significant differences for all but the neurotic scale. An additional attempt to validate the psychotic scale against a different hospital population failed to produce significant results.

The obtained data, especially item clusters, were also analyzed subjectively and point to the importance of suppressive, repressive, and sublimation factors. Excessive, inappropriate, brittle suppression appears to be characteristic of the psychotic cluster, compared to the more appropriate defensiveness found in normals. Items selected by neurotics have a hysterical, exhibitionistic, and self-punitive flavor. The psychopathic group choose items profoundly different from those of any of the other categories. The "psychopathy" scale might turn out to be of considerable value to the clinician and the "normal" scale, which differentiates effectively between the responses of normals and those of other groups, follows suit. The use of any of these scales requires a fair amount of intactness and ability to communicate effectively. They are therefore unsuited for deteriorated, regressed, negativistic, or nonverbal psychotics. A more careful selection of cases might have produced a workable neurotic scale. The type of methodology employed appears to be promising for clinical and research purposes.

This study also points to the use of dreams as a diagnostic tool within the clinical interview. The clinician, by increasing his sensitivity to the dream productions of his patients, is able to establish a valuable matrix of knowledge. He might be able to speculate regarding ego strength, use of predominant defense mechanism, flexibility, milieu, environmental stresses, etc., by analyzing elicited material at the manifest level. Diagnostic, structural, as well as dynamic, formulations can be subsequently tested by means of objective, well-validated tools.

Division 12. Symposium: Research in Professional Practice and Its Implications for Legislative and Other Action

9:50-11:50. Ballroom, Sheraton Palace

THOMAS W. RICHARDS, Chairman

Participants: KENNETH E. CLARK, STANFORD ERICKSEN, AND NICHOLAS HOBBS.

Discussants: KATHERINE BRADWAY, ALBERT ELLIS, AND HERBERT J. SCHLESINGER.

Division 15. Selected Papers I

9:50-10:50. Green Room, St. Francis

DAVID G. RYANS, Chairman

9:50. The prediction of freshman achievement from a combination of test scores and high school grades. HAROLD M. CHAPMAN, *Southern Methodist University*.

PROBLEM: The problem of the study was to determine the value of a combination of test scores and high school grades for predicting scholastic achievement of freshman students in their first semester at Southern Methodist University.

SUBJECTS: Subjects of the study were 100 students randomly selected from the class entering Southern Methodist University in September, 1953.

PROCEDURE: As part of the freshman orientation program, the following tests were administered: ACE Psychological Examination, the Cooperative English Test, the Iowa Silent Reading Test, and the Sheer Self-Concept Test. Scores from these tests and high school grades were correlated with the criterion measure (GPA). Predictor variables bearing the closest relationship to the criterion measure were selected for the multiple regression equation.

RESULTS: These measures yielded a multiple r of .724 and accounted for 52.35 per cent of the total variance in grade point averages. Beta weights were found for each variable and then used in a formula to predict GPA for each subject in the study. The achieved GPA and the predicted GPA were then correlated and an r of .57 was found.

CONCLUSIONS: (a) The Cooperative English Test, by contributing 36.97 per cent of the total variance, proved to be a very worth-while instrument for predictive purposes. (b) The Iowa Silent Reading Test with its contribution of 13.54 per cent is a useful predictor. (c) High school grades, with a modest contribution of 4.12 per cent of the total variance, may be useful in combination with other measures. (d) The ACE, with its Q score contributing .73 per cent and L contributing -3.01 per cent, seems to be of questionable value. (e) This combination of predictor variables predicts more accurately for high achievers than for low achievers.

10:05. Evaluations of antisocial behavior by delinquents. SHEPARD A. INSEL, *Stanford University*. (Sponsor, Barry T. Jensen)

It is assumed by students of the social scene that the delinquent perceives society and its values differently than does his more conformist brother. This study addressed itself to the problem of testing the above assumption by comparing the perceptual

field of the delinquent with that of others in his society.

Since the focus of attention is upon antisocial behavior when delinquency is at issue, the specific question raised was whether delinquents perceive antisocial behavior differently from others in their society. One dimension of antisocial behavior is the degree of seriousness by which such behavior is perceived by the individual. Assuming that the degree to which society sanctions such behavior defines its relative seriousness, the major hypothesis of the study was that the delinquent would tend to perceive the seriousness of an antisocial act differently from a nondelinquent or a teacher.

Thirty-two adolescent boys legally defined as delinquents were matched along six variables with an equal number of nondelinquents. A third group, made up of thirty male teachers from the same high school as the adolescents in the study, and defined as mediators of social values in society, comprised the subjects for the study.

Using a Q-sort distribution, the subjects ranked seventy statements of specific crimes according to relative seriousness. Rank difference r 's were computed for each matched pair. The resulting mean r was .59. Each delinquent and nondelinquent sort was correlated with the composite sort of the teachers. The mean r for the teachers and delinquents was .70. The mean r for teachers and nondelinquents was .71.

Four minor hypotheses were tested. In general, the results of this study do not show delinquents to be different from others in their perception of antisocial behavior.

10:20. Effects of suggestion and age on animism. ALBERT K. KURTZ, *University of Florida*.

Dennis reported 12 to 48 per cent of animism among college students. Since his questions seemed to encourage animistic responses, suggestion might be an important factor.

PROBLEMS: (a) To determine the extent to which the number of animistic responses would be affected by context. Each test version contained 10 questions used by Dennis plus (A, control) four similar items; or (B) four definitely living items; or (C) two living and two nonliving items. (b) To measure the influence of age (or education) on animism. (c) To relate animism to sex and to intelligence.

SUBJECTS: (a) 136 elementary psychology students, and (b) 280 sixth-grade pupils.

PROCEDURE: (a) During the first psychology class period, the three test versions were distributed in cyclic order. Directions (identical for all versions) were read, asking students to state whether the objects were living or not living and to give reasons

for their answers. Scoring was conservative, poetic references not being counted. (b) All sixth-graders were tested with version B.

RESULTS: (a) The proportions of elementary psychology students giving one or more animistic responses to the three versions were .32, .34, and .31, showing no effect of suggestion. By sex, 27 per cent of males and 38 per cent of females gave animistic responses. Biserial r between animism and American Council on Education total score was $-.35$. (b) By sex, 71 per cent of sixth-grade boys, 79 per cent of girls, and 75 per cent of both showed animism. Biserial r with Stanford Achievement Test was $-.29$.

CONCLUSIONS: (a) Animism declines from about three-fourths in the sixth grade to one-third in college. (b) The college proportion is consistent with Dennis' results. (c) The high proportion in college is not due to suggestion. (d) Animism is negatively correlated with intelligence and achievement tests. (e) Girls are probably more animistic than boys.

10:35. Reality orientation and recognition among age mates, R. OMER LUCIER, CARSON MC GUIRE, AND O. B. DOUGLAS, University of Texas.

PROBLEM: To test the proposition that, independently of family background and peer acceptance, the degree of reality orientation of a boy or girl contributes to the manner in which he or she is perceived and valued in an age-mate society during later adolescence.

SUBJECTS: 230 adolescents, 117 girls and 113 boys, 88 in twelfth and 142 in eleventh grade of Textown High in 1953-54, from which experimental populations were drawn as required.

PROCEDURES: Guided by operational criteria, three trained judges assessed sets of personal themes written by subjects. They derived estimates of reality orientation in the form of an index of intensionality-extensionality (IIE) wherein adolescents at adaptation level were regarded as ambitensional. Distributions of values representing variability in life style of the family (IVO), relative acceptance among peers in an age grade (IPS), and social-stimulus value or recognition accorded by age mates (SRI) were obtained for each subject. Nominations for three kinds of behavioral models, six role assignments, and seven operational attributes, with frequencies transformed for variance analysis, provided further data on perception and valuation by age mates.

RESULTS: In assessing reality orientation, interjudge consistency was .84 with .97 reliability. IIE values ranged from 17 to 36 ($\bar{x} = 25.0$, $s = 4.25$). Regression and variance analyses indicated that psychological orientation (IIE), family background (IVO), and peer acceptance (IPS) were independent variables which contributed significantly to social-stimulus

recognition of an adolescent by age mates (SRI) in a different manner for girls and for boys in each age grade. Analyses of nomination data confirmed the observation that extensional boys and ambivalent girls were valued highly by age mates. Masculine standards associated with reality orientation operated in the twelfth grade and feminine standards at adaptation level modified age-mate recognition in the eleventh grade.

Slides.

Division 17. Longitudinal Studies of Vocational Interests

9:50-10:50. California Room, Sheraton Palace

BARRY FAGIN, Chairman

9:50. A longitudinal study of the validity of the Kuder Preference Record. C. HAROLD McCULLY, Veterans Administration.

PROBLEM: Although a considerable amount of research on the Kuder Preference Record has been reported, there has been a paucity of inquiry into the predictive validity of the instrument, particularly in terms of establishing confidence limits of estimates regarding individuals. This study sought to determine whether selected occupational criterion groups are sufficiently differentiated from a reference norm group and from each other by the instrument to permit its use with individuals other than the "approximation method" described in the test manual.

SUBJECTS: 3,354 veterans who had terminated training under Public Law 16 prior to February 28, 1952. **PROCEDURE:** Form B of the KPR had been administered to subjects prior to entry into training. Data on occupational and employment status and job satisfaction were obtained by mail questionnaire (91 per cent response) after average lapse of five years following testing. Based on occupational status at time of follow-up, eleven occupational groups were drawn from sample. Significance of difference in means was calculated on all test scales between criterion groups and reference norm group and among criterion groups. **RESULTS:** Nine of eleven criterion groups were satisfactorily differentiated from the reference group on basis of t test. Differentiation among criterion groups was less than satisfactory. Overlap in distributions between criterion groups and the reference norm group ranged from 45 to 95 per cent with a median overlap of 84 per cent. Overlap between the several criterion groups and all other criterion groups ranged from 56 to 99 per cent with a median overlap of 91.7 per cent.

CONCLUSION: Owing to the magnitude of obtained overlap in distributions, there is little basis for confidence in estimates regarding individuals, based upon KPR scores.

10:05. Permanence of measured interests of women over fifteen years. *Ross R. Thomas, Connecticut College, New London.*

PROBLEM: The present study is a 15-year retest follow-up of the interests of college women as measured by the Strong Vocational Interest Blank. It involves a sample of women comparable to that studied by Wightwick in her 8-year follow-up. Findings are compared both to those of the latter study and to results reported by Strong in his follow-up testing of men.

SUBJECTS: Eighty-one women of the original group of 155 college sophomores at Connecticut College in 1939 were re-administered the Strong VIB in 1954.

PROCEDURE: The original Strong VIB's of all the original group were rescored for the present 25 occupational scales. The respondent and nonrespondent groups did not differ as to Strong VIB scores in 1939, age, or subsequent marriage rates. Correspondence of scores in 1939 and 1954 was then determined on the basis of (a) correlation of the 25 scales, (b) differences in mean scores for the scales, (c) and changes in ratings over the 15-year period. Comparisons were then made with prior studies.

RESULTS: Tables of results are presented for the comparisons indicated. The median correlation of the 25 scales was .64, range .38 to .88. This median correlation is considerably lower than that reported for men over a 22-year period (.72). Four-fifths of the mean scale values were significantly different upon retest. Permanence of Strong VIB ratings was, however, higher than found for men after 10 years (75.4% vs. 72.1%), largely because of the greater concentration of unchanged letter ratings in the C category.

CONCLUSIONS: (a) Strong VIB scores of women are less correlated after 15 years than for men after 22 years; (b) mean scores show greater variation than found for men over 10 years; (c) letter grades, however, are more stable for women than for men, particularly at the lower (C) end of the scale.

10:20. Predictive validity of interest scores. *Edward K. Strong, Jr., Stanford University.*

PROBLEM: What is the relationship between high and low occupational interest scores and occupation engaged in 18 years afterwards?

SUBJECTS: 663 former college students were tested on the Vocational Interest Blank while in college, and retested on the average 18 years later.

PROCEDURE: Students were subdivided according to whether or not they were engaged in a given occupation. This was repeated for each occupation where at least 9 men were so engaged, and where there was an interest scale representative of the occupation. Number of A ratings for employed were contrasted with number for unemployed. Similarly for C ratings. Expectancy ratios were calculated.

Two supplementary procedures: Test scores of those employed in an occupation were contrasted with scores of criterion groups: entire test profiles were rated by five experts as to agreement with occupation engaged in.

RESULTS: Chances are 3.5 to 1 that a man with an A rating will be engaged in that specific occupation and nearly 5 to 1 that a man with a C rating will not be engaged therein. Ratios vary with different groups; the above are averages from 16 scales. Our students scored while in college 85 per cent as high as can be expected from a new criterion group. Ratings of entire interest profiles confirm the above.

Consideration is given to (a) proper method of calculating expectancy ratios and (b) conditions under which occupational interest scores may or may not predict future occupation.

CONCLUSION: The higher the occupational interest score while in college the greater the chance the man will be engaged in that specific occupation 18 years later: the lower the score below 37.5 the greater the chance he will not be so employed.

Divisions 2 and 12. Symposium: The Purposes of Psychology Curricula in Medical Education

11:00-1:00. California Room, Sheraton Palace

IVAN N. MENSCH, Chairman

Participants:

IVAN N. MENSCH. Introduction: The purposes of psychology in medical education.

BRUCE V. MOORE. Scientific and professional goals for psychology in medical education.

SAUL B. SELLS. The purposes of teaching psychology in aviation medicine.

JOHN M. STALNAKER. The purposes as seen by medical educators.

Division 8. Personality Correlates of Various Deviations

11:00-12:00. Auditorium, U. of C. Extension Bldg.

HENRY S. ODBERT, Chairman

11:00. Personality correlates of college achievement and major areas of study. *LEWIS FIELD, Bluefield Mental Health Center, AND DANIEL E. SHEER, University of Houston.*

PROBLEM: The present study was concerned with identifying personality correlates of college achievement and major areas of study, physical science vs. social science.

POPULATION: A population of 125 recent male college graduates was subdivided into two major groupings: (a) Twenty-nine high and twenty-nine low achievers, matched on age, IQ, and major field of study; (b) twenty-nine physical and twenty-nine social science majors, matched on age, IQ, and total grade-point average.

PROCEDURE: The testing techniques included: (a) Klein's judging the squares perceptual task; (b) F Scale; (c) a self-concept test utilizing a Q-sort technique which gave measures on Social Adaptability, Emotional Control, Conformity, Inquiring Intellect, and Confident Self-Expression; (d) an identification measure based on the percentage of agreement between the subject's Strong Vocational Interest Blank and the way he believed his father would fill it out; and (e) six measures of disturbance in identification derived from the Blacky Pictures Test.

RESULTS: Reliability of differences was tested with critical ratios, and biserial correlations for widespread classes between the measures and criteria were computed. (a) Significant relationships in the personality constellation for the high achievers as contrasted with the low achievers included greater Conformity, higher Inquiring Intellect and more Confident Self-Expression. They were less "authoritarian" (lower F-Scale score) and perceived themselves as more similar to their fathers in interests on the Strong. (b) Significant relationships in the personality constellation for the physical science majors as contrasted with social science majors included higher Emotional Control and Conformity. They had greater accuracy on judging the squares (Klein's "Sharpeners") and were more "authoritarian." They had higher percentage of agreement between the two Strong and less disturbance in identification as measured by the Blacky Test. (c) Data were also obtained on the correlations between the various measures used.

Slides.

11:15. A study of the personal and social attitudes of habitual traffic violators. HARRY W. CASE AND ROGER G. STEWART, *University of California, Los Angeles.*

PROBLEM: Popular opinion and legal usage have assumed that the negligent operator of an automobile or habitual violator is a separate social entity who may be expected to exhibit a concentric attitudinal matrix toward the following: (a) the law, (b) the enforcement agency, (c) concept of self, and (d)

factors pertaining to the elimination of the condition. Whether these individuals constitute a socially unique group in attitude orientation, as well as in other dimensions, becomes an important factor in the successful handling of them by social agencies.

SUBJECTS: 300 negligent operators were divided into two experimental designs—100 were used for special attitudinal studies and the 300 for compilation of sociometric data.

PROCEDURE: Psychologists gave subjects a structured and controlled interview subsequent to arrest but prior to disposition of the case. Data were compiled from the arresting citation and the previous violation history. Information concerning such factors as age, length of driving experience, economic status, habitation, place of apprehension, and trade or profession was obtained. An evaluation was made of the individual's emotional stability and intellectual capacity. The specific reason for the apprehension and an exploration of his attitudinal frame of reference was ascertained.

RESULTS: Several hypotheses were formulated concerning the negligent operator's attitude orientation toward the variables previously mentioned. These hypotheses were tested for both generalized and specific frames of reference. In nonattitudinal characteristics, the group showed reasonably normal distributions except for the frequency of violations. Concerning the attitude variants, i.e., (a) the law, (b) the enforcement agency, (c) concept of self, and (d) factors pertaining to the elimination of the condition, neither the specific nor general frames of reference were different from those to be expected by chance. It was concluded, therefore, that in the areas measured these individuals did not constitute a homogeneous attitude group.

11:30. A quantitative study of psychoanalytic hypotheses of identification. MARGERY H. KRIEGER AND PHILIP WORCHEL, *University of Texas, Austin.*

PROBLEM: To test the psychoanalytic hypotheses that: (a) homosexuals have identified with (developing personality characteristics similar to) the parent of the opposite sex; (b) neurotics have mixed, or ambivalent, identifications with both parents; (c) normals have identified with the parent of the same sex.

SUBJECTS: Ten overt and admitted homosexuals in psychiatric treatment (homosexual group); ten non-homosexual, nonpsychotic patients in psychiatric treatment (neurotic group); ten subjects who were neither homosexual nor psychiatrically ill (normal group). Each group consisted of six men and four women, ranging in age from 18 to 29 years, matched

individually across groups for age, sex, educational, and general socioeconomic level.

PROCEDURE: Q technique was utilized. A 180-statement sample, reflecting theoretically postulated products of identification (superego, character, and ego traits), was developed and validated by independent judgments. Each subject sorted the statements on a nine-step scale under four conditions, describing: (a) self, (b) ideal, (c) father, and (d) mother. The resulting statement distributions were correlated and differences between the correlations used as measures of direction of identification (same-sexed, opposite-sexed, and mixed or equal) in regard both to self and to ideal descriptions.

RESULTS: The results were reversed from theoretical expectancy: (a) homosexuals tended to identify with the same-sexed parent, and in this were significantly different from (b) neurotics, who tended to identify with the opposite-sexed parent, but showed no consistent tendency to mixed identification; (c) normals were equally divided, some showing same-sexed, others opposite-sexed identification. Definition of "types" within groups by factor analysis of self descriptions and study of case histories failed to reveal consistent or differentiating patterns of identification. Conclusions were that the original psychoanalytic hypotheses are not applicable, and that identification cannot be considered a sufficient explanation of sexual deviation or emotional disturbance.

11:45. Predicted personality differences between groups of sex offenders and nonsex offenders as reflected in group psychological tests. LEONARD D. ERON AND JOHN E. WILLIAMS, *Yale University*.

The purpose of this study was to demonstrate that if specific variables, meaningful for personality, are defined, reliable scoring categories are established and predictions are based on relevant theory, group psychological tests can be used successfully in personality assessment and in the differentiation of groups.

Subjects included 45 men confined at Connecticut State Prison for sexual offenses and 84 men confined for nonsexual offenses. These subjects constituted random samples of the entire population of sexual and nonsexual offenders at the prison. On the basis of group psychological tests (Army Alpha and Beta, Cornell Index, Group Rorschach and Group TAT) routinely administered to the entire prison population, these subjects were rated on three variables which had previously been defined and categorized according to three- and five-point scales: (a) aggressivity-passivity, (b) feminine identification, and (c) anxiety level. All identifying data were removed from the

protocols so that the raters did not know the classification for any subject. Adequate agreement was obtained by two psychologists who independently rated 35 protocols. The validity of the ratings is evidenced by confirmation of the following predictions based on dynamic psychological theory and tested by chi square: (a) Sexual offenders will give more evidence of passive tendencies in their psychological test protocols (confirmed, $p < .05$). (b) Sexual offenders will show more evidence of weakened masculine identification (confirmed, $p < .05$). (c) Sexual offenders will give fewer indications of manifest anxiety. (The obtained difference was in the predicted direction but was not highly significant $p < .20$.)

In the discussion, the proper use of group psychological tests in assessment is considered. Slides.

Division 8. Bases of Group Cohesion

11:00-12:00. Lecture Room, U. of C. Extension Bldg.

STANLEY SCHACHTER, Chairman

11:00. Experimental studies of trust and suspicion: I. The effect of motivational orientation. MORTON DEUTSCH, *Research Center for Human Relations, New York University*.

PROBLEM: The research to be reported is part of a program of research dealing with the conditions which affect the development of trust or suspicion in interpersonal relations. Theoretical analysis of social situations which permit either cooperative or uncooperative interactions indicates that an individualistic motivational orientation by the participants in the situation (i.e., each being concerned only with maximizing his own gains or minimizing his own losses) will tend to result in each participant losing as the result of the consequent inability to trust or be trustworthy. The present experiment studies the effects of individualistic, as contrasted with cooperative or competitive, motivational orientations on the development of trust in a game situation.

SUBJECTS: College students were utilized as subjects.

PROCEDURE: A two-person game situation is utilized in which the gains or losses incurred by each is a function of the choices made by the other person as well as those made by oneself. The game is so structured that if each person chooses to maximize his gains and minimize his losses, both persons will lose. Both persons can consistently gain only if there is mutual trust between the individuals. However, if one person chooses to trust the other it is to the other's immediate advantage to double-cross him. The subjects are fully aware of the nature of the game as they play it.

Three different motivational orientations are created in the subjects as they play the game: competitive (i.e., to do better than the other person); individualistic (to be concerned only with one's own outcome); and cooperative (to be interested in the welfare of the other person).

RESULTS: Significant differences are found among the motivational orientations as predicted. These results support the proposition that neither individual nor mutual gain is likely in a social situation wherein the participants are oriented only to their own welfare.

11:15. The effect of relative motivation strength on work partner choice. ELIZABETH G. FRENCH, *AFPTRC*.

PURPOSE: To determine the possibility of predicting from the relative levels of achievement and affiliation motivation whether individuals will choose as a work partner a friend who has failed at a similar task or a disliked associate who has been successful.

SUBJECTS: 204 basic airmen. The data analysis is based on 137 "critical subjects."

PROCEDURE: After making friendship ratings and taking a projective test designed to measure both achievement and affiliation motivation, the subjects were divided into groups of four to work on an "important concept formation test." The groups were so constructed that three of the subjects, the critical subjects, had rated each other as liked and the fourth as not liked. They all worked individually on a sorting task at which the disliked subject was made to succeed and the others to fail. Then all subjects wrote down either one first or a first and a second choice for a work partner.

RESULTS: Chi-square analyses of the four motivation combination groups indicated that, according to prediction: (a) Subjects high in achievement and low in affiliation motivation made significantly more single choices of the success person. (b) Subjects high in affiliation and low in achievement made significantly more choices of one or two friends. (c) Subjects high in both motivations made significantly more double choices involving both a friend and the success person. (d) Subjects low in both showed no patterning.

In addition, the achievement motivation mean scores showed a significant increase and the affiliation a significant decrease from subjects choosing the friends, through subjects choosing both, to subjects choosing the success person only.

CONCLUSION: Choice behavior can be predicted from motivation test scores.

11:30. Increased attraction to the group as a function of individual and group goal attainment. BERNARD M. BASS, *Louisiana State University*.

PROBLEM: To relate attraction to a group with various objective products of interaction purporting to assess group effectiveness to confirm a theorem of a proposed leadership theory.

SUBJECTS: 95 night-school psychology students directed by fiat to serve as subjects.

PROCEDURE: For each of 19 groups, 5 subjects, (i, j, \dots, n) privately rank-ordered (X) a set of 5 words (a, b, \dots, c) according to their estimate of the words' familiarity to high school senior boys. Following a discussion the group rank-ordered the words, (G), as a group. Then, the members again privately rank-ordered the words (Y). Finally, the group was informed of the correct familiarity (R). The procedure was repeated with 12 sets of words. Each member indicated his attraction to the group before the first and after the last trial had been completed to provide an index of changed attraction.

RESULTS: Each of the measurements defined below algebraically and verbally was summed for the 5 members and the 12 problems. The product-moment correlation between these sums and increased attraction are in parentheses:

GR Accuracy of the group decision (.30)

$\sum_a RY$ Final private accuracy of the members (.42)

$\frac{1}{n-1} \sum_i^n \sum_a^a Y_i Y_i$ Members' agreement with each other finally (.43)

$\sum_a GY$ Lack of coercion in reaching group decision (or degree of consensus) (.13)

$GR - \sum_a RX$ Increase in accuracy publicly (.23)

$\sum_a^a RY - \sum_a^a RX$ Increase in accuracy privately (.64)

$\sum_a^a GY - \frac{1}{n-1} \sum_i^m \sum_a^a X_i X_i$ Coalescence publicly (.09)

$\frac{1}{n-1} \sum_i^n \sum_a^a Y_i Y_i - \sum_i^n \sum_a^a X_i X_i$ Coalescence privately (.40)

These results could not be accounted for by predisposition factors since initial accuracy, $\sum_a RX$, corre-

lated $-.12$ and initial agreement $\frac{1}{n-1} \sum_j \sum_a X_i X_j$, correlated $.10$ with increased attraction. Mere changes in response, $\sum_a XY$, and $\sum_a GX$, similarly, were unrelated (.06 and .00) to increased attraction.

CONCLUSIONS: Where involvement in the group goals is low, behavior of members is more likely to be reinforced by individual goal attainment than group success.

11:45. Study of subgrouping as a dynamic of groups. Wm. FAWCETT HILL, *Utah State Hospital, Provo.*

This study investigates the hypothesis that a knowledge of subgroup phenomena provides for understanding and predicting the dynamics of groups. A subgroup is defined as a structural unit of the total group composed of members with common group-relevant emotional needs.

The theoretical framework of the study is derived from the work of W. R. Bion in which groups are seen as if operating on two interacting variables, Work and Emotionality. Emotionality is subdivided into three categories, Pairing, Fight-flight and Dependency, and according to the theory members have valency for these emotional modalities, that is, a capacity for combining to maintain these emotional conditions in the group. Similarity of valency pattern among members is the emotional need substrate, the rationale, for subgrouping.

The Valency Subgroups (VSG's) are isolated and their characteristics identified by applying Q technique to self-perceptual member sorts. The Q-sort statements are reflective of emotional states in groups corresponding to Bionic categories. This Q sort was administered to a group at the National Training Laboratory, Bethel, Maine. Q technique yielded clusters of members, VSG's, with common valency patterns. From analysis of the VSG member sorts predictions were made as to the interaction of these subgroups. Forty-nine hypotheses were induced.

Co-observers rated the group meetings using an interaction rating system based on Bionic categories. These data provided the reality criterion. The hypotheses concerning the VSG's interaction were tested for statistical significance.

The findings strongly indicate that the valency subgroup concept allows for the understanding and prediction of essential dynamics in the group. This study was able to predict participation and leadership patterns, role of the designated leader, and the climate of the group. The findings have implications for

refinement of Bion's theoretical notions as well as modifications of the Bionic interaction rating system.

Division 9. Discussion Group: Experiences at the Center for Advanced Study in the Behavioral Sciences

11:00-12:00. Franciscan Room, Sir Francis Drake

MORRIS I. STEIN, Chairman

Division 12. Cognitive and Perceptual Functions

11:00-12:00. English Room, Sheraton Palace

ANN MAGARET GARNER, Chairman

11:00. The influence of color on reactions to incomplete figures. JACOB BERG, *Long Beach VA Hospital.*

In disputing Rorschach's hypothesis that color endowed an ink blot with "magic, affect-arousing properties," Siipola postulated that affective phenomena resulted from the conceptual difficulty arising from "hue-form incongruity." She inferred that hue had a weak or strong influence on the response depending on whether the configurations were highly or poorly structured, respectively. Since no prior determination can be made of what is highly or poorly structured from Rorschach test material, this hypothesis was never adequately tested.

In this study, test materials similar to the Street-Gestalt Test were used. Popular figures were incompletely drawn and subjects were required to perceive the object depicted under reduced cues. Twelve figures were finally selected after a trial run demonstrated they represented varying degrees of difficulty or structuredness depending on the proportion of subjects able to identify the figures correctly. Five sets were composed each differing from the others only in the hue (red, green, yellow or purple) that was applied to the white areas in each figure. One set was achromatic.

Two hundred and fifty undergraduates with normal color vision were randomly assigned to one of the five groups. Each subject saw all 12 cards in a given hue. They were instructed to tell what they saw on each card as soon as it was recognized so that the reaction time could be recorded as well as the content.

Mood's Median Test was used to analyze the skewed data. Regarding the effect of hue on latency of response, ignoring content, it was found that only one card yielded a statistically significant value in that the yellow and achromatic forms evoked longer latencies compared to the others. Testing latencies when the same correct conceptual response was elicited yielded a significant chi-square value only

for the single card as above. Here the achromatic form had a longer latency than either purple or red.

Regarding the per cent correct responses obtained for each card among the various groups, significant differences were found to hold for five cards, two of which were poorly structured while three were highly structured. With regard to the number of rejections, only one card yielded significant differences such that the purple form made for fewer rejections.

The content elicited for each card in each group was compared. Generally, the kinds of content found in the achromatic group were also found in the various chromatic groups, and vice versa. In only two instances was color able to "pull" a conceptual response in its direction.

These results indicate that stimulus hue either facilitates the response or does not delay it. Further, the presence or absence of hue itself has no significant influence on the content of the response regardless of whether the card is highly or poorly structured. Chromatic configurations are not rejected in any differentially significant fashion. These findings strongly suggest the need for replicative experimentation and new approaches and designs to get at the important variables.

Slides.

11:15. Preconscious influences upon conscious cognitive behavior. GEORGE S. KLEIN, DONALD P. SPENCE, ROBERT R. HOLT, AND SUSANNAH GOUREVITCH, *Research Center for Mental Health, New York University*.

PROBLEM: Investigations of so-called perceptual defense usually ignore the fate of the supposedly defended-against (because not conscious) presentations. Yet stimuli that do not result in conscious percepts may still affect cognitive behavior. On what levels; in what forms?

A new tachistoscopic technique permits controlled study of preconscious processes through their influences on conscious percepts. It permitted analysis of the impact of preconsciously perceived meanings on impressions of personality and physical attributes of pictured persons.

METHOD: If one stimulus (A-figure) is exposed briefly but is succeeded immediately by a second (B-figure) at a longer exposure, only the second is consciously "seen." B-stimuli were three line drawings of a human figure ambiguous as to sex. A-stimuli were: (a) male genitals; (b) female genitals; (c) masculine symbol (trylon and perisphere); (d) feminine symbol (spherical triangle). A-stimuli were presented in different pairings with B-stimuli both subliminally and supraliminally in a balanced design.

Same B-figures were later shown to subjects, preceded by the A-figure of different sex. After each pairing, subject drew the B-figure, described its thoughts and feelings, and rated it on a personality checklist.

RESULTS: Drawings of B-figures by 20 male subjects were judged by 5 raters as having significantly more masculinity and tension signs when preceded subliminally by male than when preceded by female genitals. Such changes in emphasis as thicker, straighter lines, disproportionate facial features, and harsher expressions appeared in drawings preceded by subliminal male genitals. Ratings on the personality checklist also showed the masculine emphasis with the subliminal male A-figure ($p = .05$). Subliminal and supraliminal presentations of A-stimuli produced different trends both in groups and in subjects.

CONCLUSION: Changes in drawings and ratings suggest distinctive defensive reactions to preconsciously and consciously aroused meanings, as well as partial discharge of tension through symbolic elaboration. Slides.

11:30. Sources of ambiguity in psychological reports. CARLOS A. CUADRA AND WILLIAM P. ALBAUGH, *VA Hospital, Downey, Illinois*.

PROBLEM: Despite the importance of psychological testing in clinical work, little or no research has appeared which attempts to evaluate objectively the adequacy with which ideas are transmitted through psychological reports. The present experiment investigated the degree and manner in which these reports communicate to the reader the findings and impressions of the writer, with particular reference to major areas and sources of ambiguity.

SUBJECTS: Six professional groups ($N = 56$) ordinarily having access to psychological reports: staff psychologists, psychology trainees, psychiatrists, social workers, graduate nurses and student nurses.

PROCEDURE: For each of four psychological reports, multiple-choice items were constructed dealing with statements made or areas discussed in the report. The alternatives constituted plausible although often contradictory representations of reported statements, and content ranged from behavioral descriptions to "dynamic" interpretations.

Each of the report writers indicated for every item the alternative which his report had either clearly stated or strongly implied. This procedure established the writers' intended meanings and provided an objective criterion for "correctness" of readers' interpretations.

The four reports and accompanying 96-item ques-

tionnaire were given to the 56 judges, who were instructed to indicate for each item the alternative clearly stated or strongly implied in the reports. Every effort was made to simulate the comparatively free conditions under which such reports are usually read.

RESULTS: Correspondence between the report writers' intended meanings and the readers' interpretations was fairly low for all of the reports, averaging 53 per cent for the combined groups. There was a small but significant (.01) variation among the groups, the relative positions conforming to theoretical expectations. Systematic analysis of 20 items having the greatest variability in interpretation showed that the greatest difficulty was with questions of emphasis and degree.

DISCUSSION: Research methodology and significance of present results are discussed with implications for improving psychological communication.

11:45. The marital status of psychoanalysis and learning theory. JOSEPH G. SHEEHAN, *University of California, Los Angeles.*

The union of psychoanalytic and learning theory, so strenuously promoted in recent years, may prove to be not much more compatible in certain respects than many another shotgun marriage. Through some peculiar phenomena of isolation, repression or fixation upon goal object, fundamental areas of disagreement have been neglected.

I. Psychosexual Development. Freud has compared the stages of psychosexual development to an army advancing through enemy territory. If the army meets stiff resistance at a particular point, that is, if there are many frustrations, then a larger detachment of troops is left at that point. Stated in behavior theory, this would mean that where there are failures to obtain need satisfaction or drive reduction, more of the instrumental acts will continue. In actuality, drive-reduction learning theory would predict the opposite, namely, that where approach responses are not successful they will drop out.

In terms of reinforcement theory, why does the army march at all?

II. The Work of Mourning. In behavioral terms, the act of mourning appears to involve a seeking out of punishment.

What principles of learning account for behavior which keeps seeking little bits of punishment in order to accept a big punishment? The process functions clearly enough, in Freud's language, in accordance with the reality principle. But modern learning theory is peculiarly vacant of accounts of such behavior.

III. The Neurotic Paradox. The Mowrer-Ullman hypothesis states that neurotic behavior persists be-

cause the reward occurs first and the punishment not until later.

In apposition the Freudian position is that neuroses will survive even if immediately painful, so long as there is a long-term need for them.

Two levels of disagreement are evident here: (a) the factual disagreement as to where the punishments and rewards occur; (b) the theoretical disagreement as to whether the immediate or the long-term consequence has the determining effect.

These are areas of conflict that need resolution, if the couple is to live happily ever after.

Division 12. Symposium: The Psychosomatic Frontier in Psychology

11:00 A.M.-1:00 P.M. Concert Room, Sheraton Palace

HERMAN FEIFEL, Chairman

Participants:

ROBERT B. MALMO. Role of experimental psychology in psychosomatic medicine.

HYMAN MILLER. Children's experiences and psychosomatic patterns.

HERMAN FEIFEL. Current theories in psychosomatic medicine.

MORTON A. MEYER. Problems of the internist with regard to emotional factors in physical illness.

Discussants: JURGEN RUESCH AND THOMAS S. SZASZ

Division 15. Student Variables in Achievement

11:00-12:00. Green Room, St. Francis

HERBERT SORENSEN, Chairman

11:00. Performance of upper and lower social class children on two measures of intelligence. Part II: The estimates of intelligence and social status. FRANCIS E. DIAZ, *University of California, Los Angeles.* (Sponsor, David G. Ryans)

PROBLEM: Part I of the study here reported showed the Davis Eells Test of General Intelligence (D-E Test) to be somewhat more culture-fair than the total and language part of the California Short-Form Test of Mental Maturity (CTMM). It was the purpose of the present analysis to test the hypothesis that the estimates of intelligence yielded by the two tests did not differ in their relationship to an independent measure of social status.

SUBJECTS: The subjects were upper sixth grade pupils in a single school system, resident in one suburban city of Los Angeles.

PROCEDURES: The subjects were given both tests and rated on a modified version of Warner's Index of Status Characteristics. The ratings were used to indicate the subjects' social class membership.

Analyses of variance and correlation techniques were used to analyze the test scores as they related to social status. The total scores of the D-E Test and the CTMM, as well as the language (CTMM-L) and the nonlanguage (CTMM-NL) part scores of the CTMM were analyzed.

RESULTS: Four social class groups were found, corresponding, except, for the highest, to Warner's classes. The analyses of variance revealed that both tests differentiated the social classes about equally well.

Mean test score differences among the social classes had critical ratios of from 6.7 to 36.8 for the D-E Test and from 5.3 to 48.6 for the CTMM. Correlation coefficients between estimates of intelligence and indices of social status were found to differ within chance limits.

CONCLUSIONS: The null hypothesis is not refuted. The evidence seems to be opposed to some of the theoretical proposals advanced by Davis and Eells concerning this problem.

11:15. Personality factors associated with academic achievement in college. RALPH M. RUST AND FRANCIS J. RYAN, *Department of University Health, Yale University.*

PROBLEM: Deviation from academic achievement in college is thought to be related to differences in the degree to which students have introjected (or integrated) moral and social values of parents and community.

SUBJECTS: Groups of overachievers, normal achievers, and underachievers were chosen from scattergrams of average grades and general prediction (a weighted combination of adjusted secondary school grades, Scholastic Aptitude Test—Verbal Section, and College Entrance Examination Board Achievement Tests) so that the groups did not differ significantly in prediction, but differed widely in average grades. There were 267 upperclassmen in the first of two studies and 388 in the second.

PROCEDURE: In each study subjects completed a rather lengthy questionnaire on background, educational and vocational orientation, study habits in college and in secondary school, relationships with parents, and "moral" attitudes. The questionnaire was essentially the same in both studies.

RESULTS: There were no differences in cooperation among the three groups. Deviation in academic achievement at college is related (as indicated by significant differences among groups in both studies) to secondary school background and to differential change in reported study habits. Although there are no differences in study habits at secondary school, there are marked differences in college study habits.

In addition, overachievers are more likely to report behavior indicative of conformity with high moral values—they are less likely to smoke, to drink, or to have had sexual intercourse. There are practically no consistent differences in reported relationships with parents, nor in "moral" attitudes.

CONCLUSIONS: Behavior favorable to good grades in college seems to persist (or change) differentially in college underachievers and overachievers. Reported differences in certain other behavior indicates a possible relationship to variations in the integration or introjection of moral and social values. The way in which this process is accentuated or interfered with is not indicated by the present study.

11:30. Comprehension of written language (reading) and oral language (auding) as related to "cultural bias" on the Davis-Eells Games and the California Test of Mental Maturity. THOMAS WOOD SMITH AND JOHN CAFFREY, *Division of Research and Guidance, Los Angeles County Schools.*

PURPOSE: To explore several important assumptions made by Allison Davis and Kenneth Eells: (a) "cultural bias" in intelligence tests is the result, in part, of placing a premium on reading; (b) a "culturally fairer" test will result when oral language comprehension is substituted for reading; (c) the "predictive" power of an intelligence test is based upon the extent to which it samples the skills it is "predicting." **SUBJECTS:** 302 fifth-grade pupils drawn from six school districts in varied geographic and socioeconomic areas of Los Angeles County. Bilingual subjects were not included.

PROCEDURES: All subjects were tested with the California Test of Mental Maturity, the California Achievement Test, the Davis-Eells Games, and an Experimental Test of Oral Language Comprehension. For an index of pupil background, specific descriptions of parental occupations were ranked according to the 7-point system described by Lloyd Warner.

RESULTS: (a) "Cultural bias" was present in a "limited" but significant degree in both the Games and the Mental Maturity Test. The relationship between the two tests was also "limited." (b) Reading contributed the greatest "bias" to the Mental Maturity Test, and oral language comprehension (auding) added the most "bias" to the Games. Both reading and auding, only "moderately" related themselves, were equally related to occupational background—apparently equally capable of being sources of test "bias." (c) Although the Mental Maturity Test had a "high" degree of "prediction" for school achievement and the Games only a "moderate" de-

gree, both were reduced to a "limited" or small degree when reading skill was held constant. The first and third assumptions were supported; the second was questioned.

CONCLUSIONS: A "culturally fair" test probably will have to be, among other things, truly a nonlanguage test. To establish the "predictive" value of such a test may require as creative an effort as will be needed to design it in the first place. Perhaps even a re-examination of the relationship between social and educational objectives will be necessary.

11:45. A study of the factors affecting the college-going plans of high-aptitude high school seniors. **GLEN STICE, WILLIAM G. MOLLENKOPF, AND WARREN TORGERSON, *Educational Testing Service.***

The purpose of this study was to investigate the relationships between various student-background factors and their educational and vocational plans.

To secure appropriate data for carrying out the study, a short academic aptitude test was combined with a questionnaire covering background factors and post-high school plans and given to all of the senior students present on a given day in over 500 public secondary schools throughout the United States. In selecting the schools for participation in the study, the country was divided into the four census regions, and all public secondary schools in each region were listed in order of school size. Every twentieth school from each list was designated. Approximately two-thirds of the schools in the intended sample cooperated in the study; more than four-fifths of the students in the intended sample were in these participating schools. Intensive telephone follow-up was used to get a bias-free subsample. The test and questionnaire together required forty-five minutes for administration.

The twenty-item test was scored for all students and the questionnaire data for the highest scoring 30 per cent of the group (about 10,000 cards) were then analyzed. All analyses were carried out separately for boys and for girls.

Results to be reported will include a description of the relationship of college plans (whether going or not; if going, what kind of school and intended area of study) to various background factors, including such variables as geographical region, sex, community type, vocational plans, education and occupation of parents, and family size. Significant relationships were found between all of these factors and both the number of students planning to go on to college and the nature of their plans.

This study has been supported by funds from the National Science Foundation.

Division 17. Measurement and Techniques

11:00-12:00. Room A, Sheraton Palace

DONALD W. BAILEY, Chairman

11:00. Self-rating as a counseling criterion. CLIFFORD P. FROEHLICH, *School of Education, University of California, Berkeley.*

The purpose of this study is to assess the usefulness of self-ratings as a criterion of counseling effectiveness. The self-ratings of counselees were compared with test scores before and after counseling. "Improvement" on the criterion variable was defined as greater agreement between test scores and ratings.

The population of the study is 466 high school students divided into three groups: counseled, counseled-without-test, and not counseled. All students were counseled by advanced graduate students in counseling psychology enrolled in the University of California.

The following hypotheses were tested: (a) There will be a significant difference between the agreement of precounseling ratings with test score and the agreement of postcounseling rating with test score: counselees' changes in agreement would be in the direction of greater agreement; (b) The counseled group will show greater improvement in the agreement of ratings with scores than the noncounseled group; (c) Older counselees will show greater improvement on the criterion than younger ones; (d) Counselees in the higher grades will improve on the criterion measure more than those in lower grades; (e) Counselees showing greater improvement on the criterion will have higher scores on a measure of intelligence than will those showing less improvement on the criterion; (f) Sex would be a factor, in that a larger proportion of the females than of the males would show improvement on the criterion; (g) Counselees with greater improvement on the criterion will have had more tests interpreted during counseling than those with less improvement; and (h) More counselees who indicated an initial desire for counseling would show improvement on the criterion than would those who did not.

The criterion of agreement between self-ratings and test scores varied in the expected direction. It followed the logic of improved self-knowledge after counseling. From this point of view it appeared to hold promise as a useful criterion of counseling effectiveness.

11:15. An analysis of disagreements concerning validity of items of an interest inventory. WILLIS W. CLARK, *California Test Bureau.*

PROBLEM: The original items of a paired-comparison occupational interest inventory were classified into six fields by twelve persons competent in educational and vocational guidance, using mutually acceptable criteria; differences were reconciled by a committee of four. Recently an article, published in *Journal of Applied Psychology*, presented data obtained from 38 raters (presumably equally competent) using independent judgments indicating substantial disagreement as to the classification of 57 of 240 items. The *Encyclopedia of Educational Research* indicates that composite ratings of five to nine competent raters is adequate (p. 962).

PROCEDURE: By use of 200 inventories (100 male, 100 female), phi coefficients were calculated for each of the 240 items using the score in each field as the criterion. These phi coefficients were classified by level of confidence for each sex and the composite for the two sets of ratings.

CONCLUSIONS: The results indicated that the original ratings of ninety-seven per cent of the items were statistically valid for the composite of male and female inventory data. The disagreements of the 38 ratings appear to be due to (a) failure to use homogeneous criteria for definitions of the six fields, and (b) tendency to classify by job classification rather than by nature of the behavior or activity involved.

11:30. Test pattern analysis by visual inspection.

STANLEY R. OSTROM, *California Test Bureau*.

Several methods have in the past been suggested for implementing the comparison of students' test profiles with criteria of successful performance. A simple, yet successful, technique for this function is the transparent profile.

Counselors have long been puzzled by the task of helping students choose course offerings in which their chances of successful participation are the greatest. The task of comparing a student's potential with the abilities needed to master a subject successfully or at least to profit from the content of a school subject is not an easy one. This is especially apparent when one is working with a border-line or indifferent student.

The comparison of a student's profile with a criterion profile by plotting one of the two on a transparent material and then placing it over the other is suggested as a means of carrying out this function. The criterion profile is obtained by plotting the mean scores of the battery tests for a group of students who have completed the course work with varying degrees of success. Different standards of mastery can be used. The top and bottom 10 per cent, the top and bottom 25 per cent, or simply the mean of the criterion group, may be plotted.

If the top and bottom segments of the group are plotted, the individual student's pattern, which is plotted on a transparent profile can then be compared with the patterns of relatively successful and unsuccessful students who have taken the course. If patterns are plotted for all the course offerings of an institution, a counselor can study a student's profile in the light of patterns of successful and unsuccessful students in any object the student might consider.

Similar patterns can be prepared for successful and unsuccessful workers in various occupations or professions. The transparent profile analysis could then be used in vocational counseling.

11:45. The interrelationships between ability and aptitude test scores and performance in a school for professional photographers. JOHN W. GILCHRIST, *Santa Barbara City Schools, California*.

PROBLEM: The purpose of this study is to determine the interrelationships between test scores of ability, aptitude, personality, and criteria of performance in a school for professional photographers.

SUBJECTS: 120 male veterans, mean age 26, school grade level of 12 years, who have successfully completed a term in a photography school.

PROCEDURE: A battery of tests, including verbal and nonverbal ability, spatial relations, speed and accuracy, interest inventory and a personality inventory (Minnesota Multiphasic Personality Inventory) was administered. Ratings in various areas of achievement, essential to success in photography, were obtained from members of the school staff.

RESULTS: A Pearson product-moment correlation was computed between the various test scores and subtest scores and the criteria. The Wherry-Doolittle Test Selection Method was used to determine the predictive value of the tests taken together.

CONCLUSIONS: Certain tests when taken by themselves appear to be predictive of success. Ruch's Survey of Space Relations shows an $R = .35$. When the Mf scale of the Minnesota Multiphasic Personality Inventory was considered with this, using the Wherry-Doolittle Test Selection Method, the R with the criteria was increased to .40. Four tests were found to add to the predictive value. Further, a personality pattern typical to these students also appeared.

Division 18. Meeting, Society of Correctional Psychologists

11:00-12:00. Room 220, St. Francis

Division 18. Contributions to Improved Public Service Programs

11:00-12:00. Italian Room, St. Francis

ALBERT P. MASLOW, Chairman

11:00. The sentence-completion technique as a means of predicting the personality adjustment of Federal employees serving overseas. *SAMUEL KAVRUCK, U. S. Civil Service Commission.*

PROBLEM: To determine the value of using a structured approach on the responses to incomplete sentences in the selection of Federal employees who would tend to adjust in overseas assignments.

PROCEDURE: The Holsopple-Miale sentence completion test was administered to 1,059 employees in three occupational groups serving in overseas posts. The criterion, secured by the nominating technique, indicated the individual's adjustment to local conditions, ability to get along with local people, adjustment to co-workers, and over-all job satisfactoriness and adjustment. Two criterion groups, one rated high and one rated low in adjustment, were selected. In addition, 91 cases were identified as a "bad record" group, with histories of alcoholism, criminal records, and other poor behavior patterns. The analysis was performed on 341 cases. A sample of 342 cases and the "bad record" group was retained for cross-validation. Data on age, education, and mental ability were available to aid in matching the groups. Test responses were grouped into 349 scoring categories based on similarity of response, using IBM facilities. Reliability of the test was estimated by test-retest with 23 employees. Interscorer agreement was determined for two raters. Differences in group responses were determined by chi square.

RESULTS: The coefficient of stability using per cent of agreement and disagreement between responses was .85. Interscorer agreement for two raters was .946. The mean test score for the "bad record" group was significantly lower than that of employees rated high, but significantly higher than that of the low-rated group. The index of selective efficiency based on the cross validation analysis was .56.

CONCLUSIONS: Methods of objectifying the scoring of responses to incomplete sentences appear feasible. In the present study, while complete objectivity in scoring has not been attained, the method appears to hold promise for use in a civil service examining system.

11:15. Use of achievement tests to select subprofessional employees for professional engineering positions. *WILLIAM JASPER, Board of U. S. Civil Service Examiners for Scientists and Engineers, Navy Department, Pasadena.*

PROBLEM: To determine the effectiveness of an achievement battery in selecting subprofessional employees who lack engineering degrees for professional engineering positions.

SUBJECTS: An unselected group of 266 subprofessional employees and a random sample of 115 professional engineers employed at seven Naval laboratories.

PROCEDURE: An achievement battery composed of a test in engineering fundamentals and specialized tests in several fields of engineering was administered to professional and subprofessional groups. Correlations were obtained between test scores and a degree-non-degree criterion. Scores were also correlated with supervisory ratings of subprofessional employees engaged in electronics work at two laboratories. The fundamental test was correlated with a test composed of questions from the fundamentals part of the California Engineer-in-Training Registration Examination. A follow-up study was also conducted to evaluate the performance of employees who had passed the tests and were subsequently reassigned to professional positions. Supervisory ratings were obtained through the use of "semi-structured" interviews.

RESULTS AND CONCLUSIONS: Correlations ranging from .54 to .92 were obtained between the test scores and the degree-nondegree criterion, indicating that the tests can be used to predict membership within the professional group. Multiple correlations of .71 and .72 between over-all supervisory ratings and a weighted combination of the fundamental and electronics tests were obtained for groups at two laboratories. The fundamental test correlated .77 with the California examination. The follow-up study indicated that employees who had passed the tests and were reassigned to professional positions were performing satisfactorily and in a number of cases had made substantial scientific contributions to laboratory work. In view of the current critical shortage of engineering talent available from outside sources, the most significant result of the program has been the improved utilization of existing manpower at the laboratories through the use of an objective testing technique.

11:30. A report of a factor study of verbal tests. *MELVIN D. DAVIDOFF AND DOROTHY E. GREEN, U. S. Civil Service Commission.*

PROBLEM: To investigate the factor structure and overlap of verbal tests actually or potentially in use in this agency.

SUBJECTS: Samples of two Air Force enlisted populations undergoing classification shortly after recruitment.

PROCEDURE: A Lackland Air Force Base sample of 751 men was used for tryouts and reliability determinations. A Sampson Air Force Base sample of 832 was used to obtain the correlation matrix. Not every man took every test, however. Overlapping groups were used which resulted in intercorrelations

being based on a minimum sample of 260. The battery consisted of 28 tests. They included various types of word knowledge, verbal fluency, reading, judgment, grammar, and spelling tests. The battery was subjected to Multiple Group Factor Analysis.

RESULTS AND CONCLUSIONS: Four factors were found by the multiple group method and identified as word-meaning, word fluency, grammar-spelling, and reading comprehension. The word-meaning factor is a general factor on which all tests have loadings. The remainder of the common variance is apportioned approximately equally among the other three factors. The reading-comprehension tests, the judgment tests and a proverb interpretation test have loadings on the reading comprehension factor. No judgment factor appeared. The grammar and spelling tests have moderately high loadings on a common factor and near zero loadings on the other two group factors. Such a large proportion of the reliable variance of the vocabulary, reading, and judgment tests (exclusive of "Scientific Judgment") is accounted for by common variance, that considerable justification would seem necessary profitably to use variant forms of these test types.

11:45. The role of the department of psychology in the rehabilitation of the institutionalized mentally retarded. HENRY LELAND AND I. IGNACY GOLDBERG, Muscatatuck State School, Butlerville, Indiana.

PROBLEM: To develop the function of a psychology department in a state institution for mentally retarded within the framework of a patient-centered team.

PROCEDURE: To determine the present status of psychology in state institutions, an unstructured questionnaire was sent to 101 institutions in the USA and Canada. The questionnaire contained three questions: (a) Do you have a psychology department in your institution? (b) If yes, how many members? (c) What is the role and function of psychology in the program of the institution?

Replies received from 65 per cent of the total sent were analyzed. Thirteen reported no psychology department. The remainder were grouped into seven geographical divisions to determine if there were regional differences. Literature of the past decade on the role of psychology in state institutions was reviewed.

DISCUSSION: Using the previously described information, and the experience of the authors at Muscatatuck State School, the following role for a department of psychology in state institutions has been devised:

1. A full-fledged partnership with the medical, social service, colony (cottage) life, business adminis-

tration, and rehabilitation (education, training, and adjunctive services) departments in the total program planning of the institution.

2. An integral part of the diagnosis, the program planning, and the follow-up in the rehabilitative processes of all patients.

3. Utilizing the special skills, training, and experience of the psychologist in the areas of patients' rehabilitation program where he can be of greatest value.

4. Initiating and/or cooperating in special areas of research aimed at finding better ways of raising the patients' physical, mental, and social efficiency.

5. Serving as part of the team in interpreting to interns, employees, parents, and to the public in general, various aspects of mental retardation with all associated handicaps and disabilities.

SATURDAY AFTERNOON, SEPTEMBER 3

Luncheon for Incoming and Outgoing Division Secretaries, APA

12:00. Room 2042, Sheraton Palace

Psi Chi Luncheon and Business Meeting

12:00-3:40. Room 261, St. Francis

Reports of Topic Chairmen to the Conference of State Psychological Associations

1:30-3:30. Monterey Room, Sir Francis Drake
GEORGE F. J. LEHNER, Chairman

National Council on Psychological Aspects of Physical Disability, Business Meeting

1:30-2:30. Room 2051, Sheraton Palace

JAMES F. GARRETT, U. S. Office of Vocational Rehabilitation, Chairman

Western Psychological Association, Business Meeting

1:30-3:30. Concert Room, Sheraton Palace

Meeting of the Joint Committee of Divisions 5, 7, 12, 15, 16, 17, and 20

1:30-3:30. Room 2062, Sheraton Palace

Divisions 7, 12, and 17. Symposium: Behavior Theory and Applications of Theory

1:30-3:30. Ballroom, Sheraton Palace

EDWARD JOSEPH SHOBEN, JR., Chairman

Participants: GREGORY A. KIMBLE, CARL R. ROGERS, AND O. HOBART MOWRER. JAMES G. MILLER, Summarizer.

Division 8. Anxiety

1:30-2:30. Lecture Room, U. of C. Extension Bldg.

SAUL B. SELLS, Chairman

1:30. Vigilance and defense as anxiety manifestations. DONALD P. SPENCE, *Research Center for Mental Health, New York University*.

PROBLEM: It is generally assumed, but only partially tested, that anxiety precipitates vigilant and defensive reactions to tachistoscopic stimuli. This study investigates the relation of recognition thresholds to measurable differences in anxiety associated with failure words.

SUBJECTS: Twenty-two adults, 17 men and five women.

PROCEDURE: Six to eight five-letter words of equal frequency count were associated with failure in an impossible anagram task; an equal number of words matched for length, frequency, and recognition threshold were presented in a nonfailure, control task. Anxiety created by failure was estimated by an Anxiety Ratio based on ten keyed items of a 145-item check list of mood adjectives administered after the failure. Recall and recognition thresholds for failure and control words were measured after the failure.

RESULTS: High Anxiety Ratio was associated with large absolute differences between recognition thresholds for failure and control words; low Anxiety Ratio was associated with little or no difference. A rank order correlation of .57 ($p < .01$) was obtained between Anxiety Ratio and absolute difference between failure and control recognition thresholds. Subjects with high Anxiety Ratio were either vigilant or defensive in their reactions to failure words. High Anxiety Ratio was also associated with the forgetting of failure words ($\rho = .49, p < .05$).

CONCLUSIONS: The tendency for failure-provoked anxiety to produce both vigilant and defensive reactions is consistent with previous perception studies. Equally important is the finding that magnitude of the reaction is systematically related to the anxiety provoked by the failure words, while the character of the reaction—vigilant or defensive—is not. These findings encourage examination of perceptual vigilance and defense within the framework of anxiety theory.

1:45. Relationship between visual and auditory discrimination and anxiety level. ORA JONES AND LOUIS D. COHEN, *Duke University*.

PROBLEM: Since previous studies have shown that high anxiety (HA) subjects have lower and more variable flicker fusion thresholds (FFT) than low

anxiety (LA), the present study was designed to test whether (a) similar differential response patterns would be noted in an auditory discrimination task and (b) subjects would show similar response patterns on both visual and auditory tasks.

SUBJECTS: Three groups of twenty male subjects were selected from serial admissions and consultations at a VA general hospital on the basis of noninterfering physical criteria. High, medium, and low anxiety groups were designated by agreement among three of four anxiety criteria: Two separate ratings on the Lorr Scale, Taylor Manifest Anxiety Scale, and the Duke Complaint Check List.

PROCEDURE: The flicker equipment was an electronic apparatus which provided a 20-60 cps range, each exposure lasting 1.5 seconds. The auditory equipment was an electronic apparatus which provided two clicks of equal duration separated by an adjustable time interval, ranging from .6 to 66 milliseconds. Subjects were administered three trials of ten runs each by method of limits procedure on both tasks.

Data were plotted on normal probability paper which yielded two measures: threshold (sensitivity) and slope (variability). Results were evaluated by analysis of variance and nonparametric techniques. Rank Order correlations were obtained between visual and auditory measurements.

RESULTS: Threshold and slope measures for both visual and auditory tasks varied in accordance with anxiety level. The HA group was reliably less sensitive and more variable on both tasks than the LA group. However, the visual task was more effective than the auditory in discriminating among groups. Although significant correlations between visual and auditory thresholds and slopes ($p < .05$) were found, there was considerable intragroup variability.

This study was supported in part by USPHS Grant M887.

2:00. Personality correlates of GSR responsivity in a lie-detection situation. JACK BLOCK, *Institute of Personality Assessment and Research, University of California, Berkeley*.

PROBLEM: To examine the personality characteristics associated with GSR reactivity and nonreactivity in a lie-detection situation.

SUBJECTS: Seventy applicants to a medical school underwent the procedure, which was part of an assessment program.

PROCEDURE: The subject was instructed to select one of a specified set of alternatives, without indicating his choice to the examiner. The examiner then queried him several times on each possibility, employing a fixed order. To each question, the subject was instructed to answer "no." There were three

replications of the procedure for each subject. Electrodermal responses were recorded.

Some subjects displayed generalized GSR responsivity and some subjects were relatively non-reactive while most were selectively responsive, the GSR appearing in general only after the lie. Classification of subjects into the categories of Reactors (N equals 20), Nonreactors (N equals 20) and Intermediate Reactors (N equals 30) was highly reliable. Reactors were compared with Nonreactors on independently measured rating and test variables.

Reactors were rated as directing tension inward, protective of those close to them, submissive, seeking of reassurance, withdrawing in the face of frustration, having easily aroused guilt feelings, moralistic and strict, and ethically consistent. Nonreactors were evaluated significantly more often as expressing hostility directly, valuing of personal autonomy, skeptical and critical, over-compensatory in their handling of fears, rebellious, masculine, and as having unconventional thought processes.

On the MMPI, Reactors were significantly higher on Depression and Psychasthenia while Nonreactors scored higher on Hypomania and Ego-Strength. Additional findings will be reported.

CONCLUSIONS: An internalizing-externalizing dimension appears to underlie the present data. These results support and extend the previous work by H. E. Jones and his collaborators on patterns of emotional expression. In addition, the present findings have implications for the limitations of the lie detector when incautiously employed.

2:15. The evocation of anxiety and performance changes under minimal doses of adrenalin.

HAROLD BASOWITZ, SHELDON J. KORCHIN, AND DONALD OKEN, *Institute for Psychosomatic and Psychiatric Research and Training, Michael Reese Hospital.*

Numerous investigators have demonstrated that the release of adrenalin accompanies stress response and is associated with the occurrence of anxiety. The present study attempted to explore whether prolonged intravenous adrenalin infusion at a low dose level (5 μ g./kg. body wt./hr.) reactivated habitual idiosyncratic anxiety patterns in normal persons. The effect of this dosage on psychological and motor functions known to be disturbed in anxiety was also assessed.

Subjects were 12 medical interns from 24 to 28 years of age. Each underwent three occasions of evaluation. The first consisted of a clinical interview which focused on the individual's past history of stress reaction and how he has previously experienced anxiety in terms of the development of consciously

felt foreboding or dread and somatic concomitants. The second and third sessions, adrenalin and saline (control) conditions arranged in counterbalanced order, occurred on successive days one week later. On both days the subject received identical treatment except for the experimental solution which was unknown both to him and to the experimenter. Continuous observation of subjective and physical changes and periodic pulse rate and blood pressure measurements were recorded. In addition, the following tasks were administered: flicker fusion frequency, hand steadiness, physical persistence, memory for digits, the Stroop test, a motor inhibition situation, and word fluency under distraction.

Pulse rate and pulse pressure were moderately elevated during the adrenalin condition. At the same time steadiness, persistence, and motor inhibition showed a significant decrease. The most common subjective response was a perception of heightened heart rate and/or heart beat. More impressive was a distinct tendency for personally patterned symptoms to develop, which were consistent with the individual's past history of anxiety. Adrenalin action thus leads to a reduction in motor control paralleled by common physiological symptoms. However, its total effect is understandable only by consideration of the person's psychological defense structure and characteristic reactions to stress.

Slides.

Division 9. Presidential Address, Business Meeting, and Social Hour

1:30-4:30. Empire Room, Sir Francis Drake
S. STANSFIELD SARGENT. *A Psychological View of Social Class.*

Division 12 and Society for Projective Techniques.

Symposium: Application of the Rorschach to Problems of Therapy, Training, and Research in a Multidisciplinary Clinic and Training Center

1:30-3:30. California Room, Sheraton Palace

EMANUEL K. SCHWARTZ, Chairman

Participants: LILY H. GONDOR, RALPH H. GUNDLACH, AND BERNARD F. RIESS.

Discussants: BRUNO KLOPFER AND SAMUEL B. KUTASH.

Division 15. Selected Papers II

1:30-2:30. Green Room, St. Francis
HENRY SMITH, Chairman

1:30. Schoolroom behavior problems as reported by in-service and pre-service teachers. HENRY ANGELINO AND EDMUND V. MECH, *University of Oklahoma.*

PROBLEM: In view of the mental health impetus in education, the training of teachers in this area takes on added significance. Although closely allied to an earlier study by Wickman, the purpose of the present investigation was to determine what pre-service and in-service teachers considered the most serious types of behavior problems in the classroom, in terms of identifying a "maladjusted" child.

SUBJECTS: Subjects were 262 in-service teachers and 230 pre-service teacher trainees. The in-service group possessed teaching experience ranging from one to thirty-eight years. Pre-service teacher trainees, mostly of sophomore standing, were drawn from a required undergraduate course in Human Growth and Development.

PROCEDURE: Subjects were requested to list the ten most important types of behavior problems that would indicate to the teacher that a child was "maladjusted." No list was presented to the subjects from which to choose. Subjects remained anonymous with respect to identity. Only the "first" choices were used for analysis. Those of the in-service teachers were classified into thirteen categories; those of the pre-service group required seven.

RESULTS: A series of 2×2 chi-square analyses were computed to test for differences between the pre-service and in-service groups, for the following categories: (a) Withdrawing, (b) Talking, (c) Dishonesty, (d) Uncooperativeness, (e) Inattention, (f) Aggressiveness, and (g) Impudence. Only those chi-square values reaching the .01 level of significance were accepted. The salient results were: (1) Pre-service groups expressed a greater sensitivity toward such covert "regions" as withdrawal behavior, when tested against the in-service groups; (2) In-service teachers placed a greater emphasis upon talking and impudence as indicative of classroom maladjustment.

It was concluded that whatever "mental" health knowledge a prospective teacher possesses apparently deteriorates in the actual teaching situation. Recommendations for more meaningful preparation of teachers in mental health areas are discussed.

Slides.

1:45. The use of the adjective check list in screening teaching candidates. J. C. GOWAN, *Los Angeles State College*.

Recent research has indicated the value of teacher self-ratings. Training institutions hence face the question of how to get standardized self-ratings in which the rater cannot wilfully distort the results in a socially desirable direction. The adjective check list offers possibilities for experiment in this area. The following procedure was set up.

Two sections of fifty teaching candidates at the junior year were the subjects in a five-unit semester

course in introductory education taught by the writer. An adjective check list, (after Gough), of 300 items was given each student, and he was asked to indicate about 25 adjectives which described him as he would like to be, 25 more which described him as he would hate to be, and a final 25 which described him as he actually was. At the same time, the dozen other members of one of the four class discussion groups which had met in leaderless discussion for eight sessions rated him on the same list. If two or more discussion mates checked an adjective as pertaining to a student, it was assumed that this behavior was socially discernible. Finally, each class was asked to rank in order of teaching potential every other class member by ballot. The 25 potentially best and the 25 potentially poorest teachers were selected from the two classes as the criterion groups. The ratings on the adjective check list were then analyzed against these groups.

Results indicate that both individual adjectives and patterns of adjective selection and overlap discriminate significantly between the groups. This technique may have important implications in screening and remedial work with teaching candidates.

2:00. The validity of the Thurstone Temperament Schedule with high school students. EVAN R. KEISLAR, *University of California at Los Angeles*.

PROBLEM: To test the validity of the scales *Dominant* and *Sociable* of the Thurstone Temperament Schedule with peer group ratings as criteria.

SUBJECTS: 152 boys and 171 girls who were members of the high tenth grade in a suburban high school.

PROCEDURE: A guess-who test was constructed to obtain bipolar ratings on twelve traits. Two of these traits were used as validity criteria for the Thurstone Temperament Schedule scales, *Dominant* and *Sociable*, respectively. The statements for these two guess-who ratings were adapted from the descriptions of the corresponding scales given in the manual for the Schedule.

The guess-who test and the Thurstone Temperament Schedule were administered to the entire tenth grade in the school. The standard deviations and reliabilities of the two Thurstone scales did not differ appreciably from those reported in the manual except in one instance. The two criteria were scored by the CEI method for boys and girls separately yielding reliabilities ranging from .86 to .92. The validity of the guess-who technique in this study was judged to be adequate since ratings on two of the other bipolar traits yielded a median correlation of .78 with corresponding ratings by teachers on a nine-point scale, this figure being almost as high as the reliabilities would permit.

RESULTS: The correlations between the Thurstone scale *Dominant* and the corresponding guess-who rating was .42 for the boys and .39 for the girls. The validity coefficients for the scale *Sociable* were .40 and .37 for the boys and girls, respectively. When the guess-who ratings were normalized the validity coefficients ranged from .41 to .48.

2:15. Some data on the prediction of observed teacher behaviors from the Teacher Characteristics Schedule. DAVID G. RYANS, *University of California at Los Angeles*.

PROBLEM: To what degree is the Teacher Characteristics Schedule (a preference type, paper and pencil, self-report inventory, developed and empirically keyed in connection with the Teacher Characteristics Study) useful for predicting teacher behaviors in the classroom as revealed by observation data?

SUBJECTS: Two "hold-out" samples of teachers (115 elementary; 136 secondary) randomly selected from larger groups of 978 elementary and 1,069 secondary teachers.

PROCEDURE: (a) Each teacher was observed independently by at least two trained observers. Scores were derived from the observation report for each teacher relative to three patterns of teacher behavior (previously indicated by factor analyses of observation data): X (understanding, friendly teacher behavior); Y (responsible, businesslike teacher behavior); Z (stimulating, imaginative teacher behavior.) (b) Each teacher completed the Teacher Characteristic Schedule. (c) Responses to the Schedule were correlated with the external criterion data (observation scores), scoring keys were empirically selected and cross-validated on randomly split samples, and composite scoring keys were assembled for the X, Y, and Z patterns of teacher behavior. (d) The Teacher Characteristic Schedule responses of teachers of the two hold-out samples were scored with the appropriate elementary and secondary scoring keys and the obtained scores correlated with the X, Y, and Z observation scores.

RESULTS: In the elementary teacher sample, observed teacher behaviors X, Y, and Z were correlated .49, .41, and .47 with the respective Teacher Characteristic Schedule scores. In the secondary teacher sample, the correlations were .30, .35, and .16.

Division 16. Open Meeting: Committee on Relationships with School Administrators

1:30-3:30. Room 210, Sir Francis Drake

EMALYN R. WEISS, Chairman

Divisions 16 and 17. Symposium: Interprofessional Relations between Guidance Counselors and School Psychologists

1:30-3:30. Franciscan Room. Sir Francis Drake Hotel

DONALD KITCH AND ROYAL B. EMBREE, Co-chairmen
Participants:

LAWRENCE M. BRAMMER. From the viewpoint of the counselor.

HELEN E. BOGARDUS. From the viewpoint of the school psychologist.

GOLDIE RUTH KABACK. From the viewpoint of the trainer.

Division 18. Symposium: The Research Function in the Organizational Structure of the Public Service

1:30-3:30. Room 220, St. Francis

ARTHUR BURTON, Chairman

Participants:

RALPH W. TYLER. Policy and administration.

GORDON RILEY. Interprofessional implementation.

JOHN N. PIERCE. Level of financial appropriation.

JAMES C. STAUFFACHER. Design and conduct of research.

Films. Childhood and Adolescence

1:30-5:00. Colonial Room, St. Francis

1:45. Freedom to learn. NATIONAL EDUCATION ASSOCIATION.

2:17. Hard brought up. POTOMAC FILM PRODUCERS.

3:00. Help before headlines. PSYCHOLOGICAL CINEMA REGISTER.

3:14. What about juvenile delinquency. YOUNG AMERICA FILMS.

3:29. A long time to grow: Part II . . . Four- and five-year-olds in school. L. JOSEPH STONE.

4:11. Your body during adolescence. McGRAW-HILL TEXTFILMS.

4:25. Toward emotional maturity. McGRAW-HILL TEXTFILMS.

4:43. In Paris parks. SHIRLEY CLARKE.

Rehabilitation Training Meeting. U. S. Office of Vocational Rehabilitation

2:40-4:40. Room 2051, Sheraton Palace

JAMES F. GARRETT, Chairman

Division 8. Projective Measures and Results

2:40-3:40. Lecture Room, U. of C. Extension Bldg.

THORNTON B. ROBY, Chairman

2:40. How deep need we go in analyzing personality? A procedure for answering this question in terms of increment analysis. ROBERT F. WINCH, *Northwestern University*.

2:55. The verbal behavior of bilinguals: the effects of language of response upon the TAT stories of adult French bilinguals. SUSAN M. ERVIN, *Laboratory of Human Development, Harvard University*.

Bilingual speakers provide a natural control for testing whether shifts in the language of response produce specifically predictable changes in content.

Sixty-four adult French bilinguals residing in the United States, who had learned English primarily after adolescence, were recruited as subjects. They were relatively well-educated, and of French middle-class parentage and upbringing. Data collected from each subject included interview material about the learning of English and current usage of both languages, a test of language dominance in terms of relative latencies on a bilingual word association test, and two sets of TAT stories about the same pictures, collected in both languages with an interval of six weeks. Half of the subjects told English stories orally at the first session and a matched group told French stories. An adaptation of Aron's scoring system was used.

A translation control to insure lack of bias in scoring revealed no significant differences in content scores for stories scored in the original and those scored in translation, for either language.

In terms of the language of the subjects' responses, there were differences in the predicted direction for all nine variables for which predictions had been made. Significant differences between median scores were found for physical aggression, escaping blame, and achievement, for women subjects, which were greater in English. Withdrawal and assertions of independence occurred more often in French stories, and the percentage of aggression which took the form of verbal aggression against peers was higher in French stories.

It was concluded that there are systematic differences in the content of speech of bilinguals according to the language being spoken, and that the differences are probably related to differences in social roles and standards of conduct associated with the respective language communities.

3:10. Stick figure drawings of emotional situations. ALFRED JACOBS, *University of Southern California*.

In order to test the hypothesis that drawings of emotional situations would be related to specific attitudes towards parents and towards members of the

opposite sex, 180 male college students were requested to draw, using stick figures, situations of punishment, fear, love, and reward, in which two people were interacting. A forced-choice autobiographical questionnaire, a rating scale of attitudes towards women, and a masculinity-femininity scale were also administered. The questionnaire was designed to ascertain which parent was identified by subjects as playing such roles as the disciplinarian or the source of affection. The questionnaire and rating scale were validated in terms of agreement of clinical psychologists.

In the punishment, fear, and reward drawings, two males were drawn significantly more frequently than one male and one female, whereas the drawings of love and affection, with few exceptions, contained a male and a female. Subjects drawing two males in the punishment drawing were significantly more likely than those drawing a male and a female to report that the father administered all the discipline, and to achieve a significantly greater number of low scores on a scale of hostility towards women. Individuals drawing two members of the same sex in the love or affection drawing were significantly more variable than the remaining subjects on the masculinity-femininity scale as well as the scale on source of parental affection. Thematic responses to the drawings were analyzed in terms of the most frequent antecedents, consequences, and types of responses, in order to determine the social stereotypes associated with expression of the emotions depicted in the drawings.

Slides.

3:25. An experimental study of relationships between human electroencephalograms and certain Rorschach scoring categories. CLAYTON L. BENNETT, *University of Southern California*.

It was the purpose of this investigation to compare two groups differing in the relative amounts of alpha activity in their EEG's in terms of their responses to certain Rorschach scoring categories.

The subjects were an unselected group of 59 males and 7 females, ranging in age from 19 to 45 years. The mean age of the sample was 27.5 years.

For the purpose of making the comparisons the sample was divided into two groups: Group A, consisting of 32 subjects who demonstrated alpha wave activity 50 per cent or more of the time and, Group B, consisting of 34 subjects in whose EEG's alpha activity was present less than 50 per cent of the total time. Group A records were thus comparable to the combined Davis classifications of dominant and sub-dominant. Group B combined the Davis classifications of mixed and rare.

Each subject was administered a Rorschach test,

and the protocols were scored and tabulated after the manner of Klopfer. The two disparate EEG groups were then subjected to comparisons on the basis of their average responses in a number of Rorschach scoring categories. The differences between the means were evaluated by the application of Fisher's *t* test of significance.

Significant differences between the means for Group A and Group B were obtained for the following categories at the 1 per cent level of confidence: total responses (R), total time (T) a function of R, whole responses (W%), and unusual details plus space responses (Dd, S%). At the 5 per cent level, differences were found for color responses (sumC) and the absolute number of W.

The two groups were not differentiated in terms of the following categories: large usual details (D%), small usual details (d%), form responses (F%), (FK, F, Fc%), animal responses (A%), popular responses (P), human movement responses (M), sex responses, per cent of responses to cards VIII, IX, and X, average reaction time, and average time per response.

CONCLUSIONS: Certain empirical differences were established between Group A (relatively high alpha indices) and Group B (relatively low alpha indices) on the basis of a number of Rorschach scoring categories. The differences appeared to lie primarily within the realm of intellectual functioning.

Division 15. Presidential Address and Business Meeting

2:40-4:40. Green Room, St. Francis

GUY T. BUSWELL. *Educational Theory and the Psychology of Learning.*

Division 8. Interpersonal Perception II

3:50-4:50. Lecture Room, U. of C. Extension Bldg.

E. PAUL TORRANCE, Chairman

3:50. The role of inference in forming an impression of a person. DAVID SHAPIRO, RENATO TAGIURI, AND JEROME S. BRUNER, *Harvard University.*

In forming an impression we begin with some information about a person. This information may take the form of a trait name. Jack, we might be told, is an "intelligent" man. Does this mean that Jack is "reliable"? Is he "enterprising"? Neither the dictionary nor the thesaurus specify these traits as synonyms for "intelligent." For the layman, however, people who are "intelligent" very often are thought to be "reliable" and "enterprising." These subjective conceptions about the relationships between traits

govern in part the formation of impressions. To study how trait information is utilized for making inferences and how different traits are combined into an emergent impression is the objective of this investigation.

A method for analyzing the inferences drawn by people from a single trait or from a combination of traits is presented together with the results on 1,320 subjects. Subjects were given one or two or three key traits and were asked to indicate which of 60 other trait characteristics are usually found in people who possess the given trait(s).

Key traits were ordered in terms of the number of inferences they yielded. Thus, some traits are highly informative; others convey little. Combinations of traits always generate more inferences than the same traits taken singly. When traits are combined, the agreement among subjects as to the inferences that can be made from them depends upon the compatibility of the traits in the combination. While individuals form a unitary impression from essentially incompatible traits, agreement among subjects is less than when compatible traits are presented in combination.

The manner in which trait combinations permit inferences beyond those yielded by its components is also treated. Finally, we consider differences in inference in relation to sex of the subjects, order of presentation of the key traits, and test form.

The fruitfulness of this method for the study of cognitive and social aspects of impression formation is discussed.

Slides.

4:05. The development of perceptions and behavior in newly-formed social power relationships. GEORGE K. LEVINGER, *Research Center for Group Dynamics, University of Michigan.*

PROBLEM: To investigate the sequential emergence of a group member's perceptions and behavior relevant to his social power. It was assumed that perceptions of relative power in informal groups arise from information that members gather about one another; further, that a group member's social power is based upon his ability to provide and withhold resources which are important for his group's functioning. One general hypothesis was that power relations are developed through the receipt of information concerning members' resources for contributing to the group. A second general hypothesis was that there is a continual feedback between changes in a member's perceptions of his power and in his influence behavior toward others.

SUBJECTS: 64 male college undergraduates.

PROCEDURE: In a laboratory experiment, each subject was paired with a paid participant in a series of

joint decision-making trials, ostensibly helping to develop a city planning aptitude test. The behavior of the paid participant was controlled, and the trial outcomes were prearranged.

Three variations were introduced in the information regarding the partner's task resources: (a) before the task period, in the experience he was supposed to have concerning city planning, (b) during the period, in his acceptance or rejection of the subject's suggestions, and (c) after the first half of the interaction, in the favorableness of the observer's evaluation of the partners' relative task performance. Subjects reported their perceived social power from trial to trial. Observations were recorded of subjects' influence behavior—number of influence attempts, resistances, degree of assertiveness.

RESULTS AND CONCLUSION: The hypotheses were supported. Each of the variations in the information about the partner's resources exerted an independent effect on subjects' developing perceptions of power, but the partner's acceptance or rejection had the greatest effect. Further, subjects' perceptions of their relative power varied directly with their influence behavior during the entire period.

4:20. Monetary value and the perception of persons.

JOSEPH LUFT, *San Francisco State College*.

This paper concerns itself with the meaning of income as a significant variable in influencing impressions of personality. When asked to fill out a standardized personality questionnaire for a person about whom the judge knows very little else beside his income, the judge tends to reveal both his overt and covert attitudes toward the relationship between income and personality.

Twenty-seven university students filled out a questionnaire (California Test of Personality) as they felt a \$250 a week man would. Twenty-six responded for a man earning \$42.50 a week. For convenience the former is referred to as the rich man and the latter as poor. These projected ratings were then compared to the actual scores of a group of 26 working people earning about as much as our hypothetical poor man.

The first part of the study was then repeated with fifty-two state college students whose family income was lower than that of the university students (median \$6,000 as compared to \$9,500).

Finally, the Berkeley ethnocentrism scale was administered to the university students.

RESULTS: 1. The hypothetical rich man was seen as essentially sound and happy while the poor man was seen as conflicted, insecure and quite disturbed by both the university and the state college students. 2. When compared to the actual scores of 26 poor men tested, we find they score as well in terms of sound adjust-

ment as the students' conception of the rich man. 3. The state students' evaluation of the rich man was high but significantly less so than the evaluations of the university students. Both groups held equally low opinions of the poor man's adjustment. 4. The more ethnocentric the student, the more he tended to downgrade the personalities of the rich man and the poor man—but particularly the rich man.

4:35. Inferential sets in social perception. EDWARD E. JONES, *Duke University*.

The application of theories derived from analyzing the perception of physical objects is largely inappropriate as a context for research in social perception. Since we are ultimately interested in the processes of inference and understanding that allow people to navigate in the social world, we must broaden our theoretical framework to encompass the strategies of the observer and the situations in which these strategies are promoted. The order of inferences appropriate to a given social cognitive act will be determined by the set which the observer adopts.

Three typical inferential sets are described which orient the observer to draw different kinds of conclusions from the information presented by the stimulus person. The first of these is the *causal-genetic set*, which involves the attempt to place the behavior of the stimulus person in a broad historical context in order to further prediction, control, and understanding. The second is the *value-maintenance set*, in which the stimulus person is evaluated in terms of the observer's own personal standards. Judgment is colored in this case by the extent to which the stimulus person promotes or thwarts these standards or values. The third is the *situation-matching set* in which the stimulus person is evaluated in terms of certain generalized norms or moral values which are presumed by the observer to hold in the situation.

The relations between these three sets are described in terms of certain dimensions of variation in terms of which each may be logically distinguished from the other. These dimensions are called the *distribution of phenomenal causality*, the *breadth of temporal context*, and the *application of norms* (both personal and generalized).

Seven propositions are offered which attempt to specify the situational, personal, and informational conditions under which each of the different sets would be promoted.

Division 8. Symposium: The Extension and Application of Psychoanalytic Concepts

3:50-5:50. Auditorium, U. of C. Extension Bldg.

RICHARD CHRISTIE, Chairman

Participants:

FRANZ ALEXANDER. Nonutilitarian aspects of behavior.

ELSE FRENKEL-BRUNSWIK. Psychoanalysis and personality theory.

HAROLD LASSWELL. Psychopathology and politics: Twenty-five years later.

RICHARD CHRISTIE. Problems in the application of psychoanalytic theory in social psychology.

Division 12. Symposium: The Concept "Therapist's Role" in Individual and Group Psychotherapy

3:50-5:50. California Room, Sheraton Palace
GEORGE CASTORE, Chairman

Interaction Process as the Determinant of the Therapist's and the Group's role.

Participants:

HUBERT S. COFFEY. The therapist's role and group structure.

WILLIAM U. SNYDER. The therapist's role with reference to his background and therapeutic procedures.

Divisions 8 and 12. Symposium: Toward a Positive Definition of Psychological Health

3:50-5:50. Comstock Room, Sheraton Palace
ROBERT R. HOLT, Chairman

Participants:

MARTIN MAYMAN. Clinical diagnosis of mental health.

FRANK BARRON. Conditions of psychological effectiveness.

Discussant: MARIE JAHODA.

Division 16. Session Honoring the Contribution of Dr. Lewis M. Terman

3:50-4:50. Franciscan Room, Sir Francis Drake
HELEN MARSHALL, Chairman

Division 17. Presidential Address and Business Meeting

3:50-5:50. Ballroom, Sheraton Palace
FRANCIS P. ROBINSON. *The Dynamics of Communication in Counseling.*

Division 18. Presidential Address and Business Meeting

3:50-5:50. Room 220, St. Francis
LAWRENCE S. ROGERS. *The Psychologist in Public Service and the Public.*

International Council of Women Psychologists. Reception

5:00-7:00. Monterey Room, Sir Francis Drake

Division 17. Social Hour

6:00-7:00. Room A, Sheraton Palace

SATURDAY EVENING, SEPTEMBER 3

Western Psychological Association. Dinner and Presidential Address

7:00. Concert Room, Sheraton Palace

NEIL D. WARREN. *Automation, Human Engineering, and Psychology.*

APA DAY, SUNDAY, SEPTEMBER 4

APA Day Symposium: Recent Progress and Probable Break-throughs in the Science of Psychology

9:50-12:00. Ballroom, Sheraton Palace
LAUNOR F. CARTER, Chairman

Participants:

HARRY F. HARLOW. Current and future advances in physiological and comparative psychology.

ARTHUR W. MELTON. Present accomplishments and future trends in problem solving and learning theory.

LEON FESTINGER. The relation of advances in social psychology to those in nonsocial psychology.

DONALD G. MARQUIS. Recent developments in personality theory and their implications for mental health.

Division 3. Emotional Factors in Learning

9:50-12:00. Colonial Room, St. Francis
CHARLES W. ERIKSEN, Chairman and Discussant
9:50. Conflict versus consolidation of memory to explain "retrograde amnesia" produced by ECS.
NEAL E. MILLER AND EDGAR E. COONS, *Yale University.*

Clinical observations of retrograde amnesia suggest that recently formed associations are especially subject to disruption. If true, this is of basic importance for learning theory. But these observations may be contaminated by emotional conflicts and sampling errors.

Duncan trained rats to avoid a shock to their feet by running from a dark to a lighted compartment. Different groups received ECS (electroconvulsive shock) at different intervals after each training trial. The shorter the interval, the slower the learning. But, in Duncan's design, any fear or conflict aroused by the ECS would produce the same effects as any amnesia. To control for this, we trained rats to run to a goal and then gave them trials with shocks to their feet at the goal followed by ECS 20 sec., 60 sec., or 1 hr. later. Amnesia for the foot shock should retard learning to not run; fear of ECS should accelerate it. In one experiment on 27 hungry rats learning to stop running to food, there was no evidence for amnesia; the trend was opposite to Duncan's but not statistically reliable. In another experiment on 42 rats learning to reverse an avoidance habit, the same opposite trend appeared and was reliable. This faster learning to stop running to food supports a conflict but not an amnesia hypothesis. Furthermore, an inverse correlation between interval and percentage of broken backs indicates that ECS after shorter intervals produced stronger convulsions.

As a check on possible differences in the ECS used, Duncan's design was repeated with 40 rats and his results were reproduced. Additional evidence of conflict was observed, i.e., groups with the shorter intervals between trials and ECS urinated and defecated more while being carried to the apparatus and lost more weight during training. Experimentation in this area is being continued.

Slides.

10:15. The use of d-Tubocurarine in the extinction of fear in dogs. R. L. SOLOMON, J. J. SIDD, P. D.

WATSON, AND A. H. BLACK, *Harvard University*.
PROBLEM: It has been demonstrated, by Lauer in dogs and by Smith *et al.* in humans, that learning can take place when an organism is immobilized by d-Tubocurarine. A major obstacle in obtaining quick extinction of avoidance responses is the fact that organisms respond to a danger signal (CS) before they can "find out" that it is no longer followed by noxious stimulation. It has been suggested that forced "reality testing" might facilitate extinction. Therefore, we might expect that presentation of a danger signal while an organism is immobilized by d-Tubocurarine would produce quicker extinction.

SUBJECTS: Fifteen mongrel dogs.

PROCEDURE: Each dog was trained to avoid an intense shock by nosing a panel at the sound of a tone (CS). The avoidance response terminated the tone. The first training session was terminated when a dog reached the criterion of ten avoidances in succession. During the second session each dog was curarized;

an overwhelming dose of twelve mg. was administered *i.v.* Artificial respiration was provided. The seven experimental dogs received 55 presentations of the CS while immobilized; the CS length was varied from trial to trial. The control dogs received no CS presentations under curare. In the third experimental session each dog was subjected to ordinary extinction procedure (not curarized) until a criterion of ten successive "no response" trials was met. EKG's were recorded.

RESULTS: The experimental dogs extinguished with fewer CS presentations than did the controls. There was a conditioned cardiac acceleration to the CS which decreased in magnitude during the curare extinction session.

CONCLUSIONS: Many presentations of a CS during skeletal immobilization can facilitate the subsequent extinction of an avoidance response by reducing the intensity of conditioned anxiety. An avoidance response can be partially extinguished without being exercised. There is no "dissociation" under d-Tubocurarine.

10:40. Some subcortical influences on performance in the cat. J. R. KNOTT, R. E. CORRELL, AND W. R. INGRAM, *Departments of Psychiatry and Anatomy, State University of Iowa*.

The problems investigated were: changes in emotional reactivity following lesions in certain subcortical nuclei, or during stimulation in such nuclei via implanted electrodes; and effects of such lesions, or stimulation, on performance.

Several series of cats were trained to press a bar to obtain small meatballs. Subsequently, lesions were placed, or stimulating electrodes implanted, using a stereotaxic instrument. One series was exposed to training after lesions, only. Histological study revealed the lesion limits, or the point of stimulation.

Group I involved lesions of dorsomedialis thalami (said by Schreiner *et al.* to lead to alteration in emotional reactivity and in performance of a learned sequence). Using seven animals, with less than total lesions, little affective but some final performance shift appeared.

Group II (five cats) involved lesions of ventromedialis hypothalamicus, producing, in four, profound and permanent change in emotional reactivity (intractable savagery). There was increased food intake. All were subjected to postoperative training only; none showed normal performance: three failed to learn, two were retarded. Of the latter two, one was not, the other not very, savage. A "naturally fearful" control cat also failed to learn the problem.

Group III (five cats) involved lesions of the

nucleus caudatus, without affective change. Initial decrements in performance were seen, but recovery was complete.

Group IV (12 cats) involved "subthreshold" stimulation in the hypothalamus and adjacent areas. In some cats a remarkable "arrest" of the learned act appeared. Stimulation above threshold evoked emotional response.

SUMMARY: Some subcortical sites appeared to be associated with impaired performance, but not invariably with altered emotional reactivity. The most pronounced performance shifts were accompanied by affective alteration following lesions, or involved areas in which suprathreshold stimulation led to emotional reactivity.

Slides.

16 mm. movie "clips."

11:05. Motivational-emotional factors and intracranial self-stimulation. JOSEPH V. BRADY, *Army Medical Service Graduate School*.

The present report describes an investigation of the effects of reinforcement schedules, deprivation, and emotional conditioning upon lever-pressing for electrical stimulation through subcortically placed (septal region, caudate nucleus) indwelling electrodes in carnivores and rodents.

Cats and rats were trained in lever-pressing first for regular then aperiodic intracranial electrical stimulation reward. Reinforcement on variable interval schedules produced stable lever-pressing rates negatively correlated with average interval between electrical stimulation rewards. Reinforcement on fixed ratio schedules produced characteristically high lever-pressing rates varying in stability as a function of intracranial electrical stimulus intensity ("amount of reward").

The effect of food deprivation upon lever-pressing for intracranial electrical stimulation was investigated under conditions of both regular and aperiodic electrical stimulation reinforcement schedules. Following 48 hours deprivation, lever-pressing rates for intracranial electrical stimulation were found to be reliably higher than similar rates obtained after only one hour deprivation. Measures obtained following four and 24 hours deprivation illustrate this same positive correlation between lever-pressing rate for intracranial electrical stimulation reinforcement and deprivation duration.

The effect of emotional disturbance ("fear" or "anxiety") upon lever-pressing for intracranial electrical stimulation was investigated utilizing a previously reported conditioned emotional response (CER) technique. The CER was first superimposed upon a stable lever-pressing habit for an aperiodic

water reward, appearing as suppression of the lever-pressing rate (accompanied by crouching, defecation) during presentation of a clicking noise which had been previously paired with painful electric shock to the feet. When the animals were returned to lever pressing for an aperiodic *intracranial electrical stimulation reward*, however, presentation of the clicker failed to elicit the CER. Extinction trials for the CER (clicker alone without pain shock to feet) were given during daily lever-pressing runs alternating between *water reward* on one day and *intracranial electrical stimulation reward* on the next day. The "fear" response (suppression of lever-pressing, crouching, defecation) continued to appear during the water-rewarded lever-pressing runs but could not be elicited during the intracranial stimulation-rewarded lever-pressing runs.

Slides.

16 mm. film strip.

Division 18. Symposium: Psychologists in Public Service

9:50-12:00. Empire Room, Sir Francis Drake

ROBERT S. WALDROP, Chairman

Participants: JOHN T. DAILEY, MANSEL KEENE, JOHN M. PFIFFNER, FAY HUNTER, AND ALBERT BERGESEN

Invited Address

2:00-3:15. Civic Auditorium

THEODORE M. NEWCOMB, Chairman

J. ROBERT OPPENHEIMER, Director, Institute for Advanced Study. *Analogy in Science*.

Annual Report to the Members of the American Psychological Association

3:30-5:00. Civic Auditorium

CARROLL L. SHARTLE. APA finances and the 1956 budget.

ANNE ANASTASI. Major decisions of the 1955 APA Council meetings.

FILLMORE H. SANFORD. Annual report of the Executive Secretary.

Social Hour. APA Members and Guests

5:00-6:30. Civic Auditorium

Box Supper for APA Members and Guests

6:30-8:00. Civic Auditorium

Address of the President of the American Psychological Association

8:00. Civic Auditorium

O. HOBART MOWRER, Chairman

E. LOWELL KELLY. *Consistency of the Adult Personality Over Twenty Years.*

Induction of New President

Reception for Members of the American Psychological Association

9:30. Civic Auditorium

SUNDAY EVENING, SEPTEMBER 4**Division 3. Reception**

10:00. Comstock Room, Sheraton Palace

MONDAY MORNING, SEPTEMBER 5**Meeting of Editors of Psychological Journals**

8:40-10:40. Room 212, St. Francis

ARTHUR W. MELTON, Chairman

Business Meeting of Conference of State Psychological Associations

8:40-12:00. Monterey Room, Sir Francis Drake

ROY M. DORCUS, Chairman

Psi Chi and APA Committee on Student Activities. Symposium: Cultivating Professional Interest on the Part of Students

8:40-10:40. Borgia Room, St. Francis

DAVID COLE, Chairman

Participants: C. M. LOUTTIT, DELOS WICKENS, EUGENE MILLS, EDGAR LOWELL, AND ROBERT S. DANIEL.

Division 3. Brain Function I

8:40-9:40. California Room, Sheraton Palace

ROGER BROWN LOUCKS, Chairman

8:40. A survey of the effects of lateral striate and of inferotemporal lesions upon visually-guided behavior in the monkey. WILLIAM A. WILSON, JR. AND MORTIMER MISHKIN, *Institute of Living, Hartford.*

PROBLEM: Recent findings suggest that deficits in visually-guided behavior, and only in this class of behavior, result from ablating either of the areas under consideration. Are there qualitative differences between the deficits produced by these two lesions?

SUBJECTS: Nine immature rhesus monkeys—three with bilateral inferotemporal lesions, three with bilateral lateral striate lesions, and three unoperated controls.

PROCEDURES: (a) Patterned String Problems: Eight pull-in string problems, each given twice daily in random order for 15 days, followed by the three most difficult problems, each to criterion. (b) Form Discriminations: Five painted form discriminations, each to criterion. (c) Size Threshold: Discrimination between two discs, differing greatly in size, presented to criterion, followed by seven pairings, each for two days, in which the size difference was gradually reduced. (d) Learning Set: 48 multiple-cue object discriminations, one a day, each to criterion. Also investigated were visual field and acuity, object recognition, color discrimination, transfer from colored foods to colored papers, and transfer from simultaneous to successive discriminations.

RESULTS: All operates showed deficits relative to non-operated animals on tests (a) through (d). In addition, differences were found between the two operate groups; these differences were in opposite directions on two pairs of tests. Striates were inferior to temporals on (a) Patterned Strings and (c) Size Threshold, while temporals were inferior to striates on (b) Form Discriminations and (d) Learning Set. None of the other tests differentiated so clearly between the operate groups.

CONCLUSIONS: Tests (a) and (b) confirmed predictions based on earlier experiments in which only striate or temporal operates were studied. These results, considered together with those on tests (c) and (d), suggest that the effects of the two lesions are qualitatively different, and provide evidence for a characterization of the difference in function of these areas.

Slides.

8:55. Effects of circumscribed cortical lesions upon somesthetic discrimination in the monkey. MARTHA WILSON, *Institute of Living and Yale University.* (Sponsor, Burton S. Rosner)

PROBLEM: To determine whether there is a cortical locus for somesthetic discrimination, and, if such a cortical area can be demonstrated, to determine if it is uniquely implicated in somesthetic function.

SUBJECT: Seven immature rhesus monkeys. Four monkeys sustained parieto-preoccipital resections; three with inferotemporal lesions served as controls.

PROCEDURE: The first testing group, two parietals and two temporals, was trained preoperatively on an "easy" visual form discrimination, and on both an "easy" and a "difficult" somesthetic form discrimination. Postoperatively, they were tested for retention of these habits, and were given a "difficult" visual discrimination as new learning. The second group, two parietals and one temporal, was trained preoperatively on the "easy" somesthetic task, and on both the "easy" and the "difficult" visual tasks. Postoperative retention of these discriminations was tested, and the "difficult" somesthetic task was given as new learning. The monkeys performed the somesthetic tasks in darkness and were observed by means of an infrared scanning device. Eliminating visual cues in this way, rather than by requiring the monkey to reach over a barrier or into a bag, obviated the need for awkward motor responses.

RESULTS: Consistent and prolonged deficits in learning and retention of somesthetic tasks followed the parietal lesions. Equally striking deficits on the visual tasks were evident in the temporal operated. No temporal animal showed any deficit on the somesthetic discriminations. The parietal lesions did not alter performance on visual tasks except in two monkeys who showed transient visual deficits due to inadvertent damage to optic radiations. The difficult task in each modality was more discriminative of the effects of the two lesions.

CONCLUSIONS: A selective relationship between parieto-preoccipital lesions and deficits in somesthetic discrimination was demonstrated, indicating that this cortical area is uniquely implicated in somesthetic function.

Slides.

9:10. Serial discrimination in monkeys with extensive brain damage. ROBERT W. LEARY, *University of Wisconsin*.

PROBLEM: To determine (a) the performance of two groups of brain-damaged monkeys in serial discrimination learning, and (b) the effect of additional lesions.

SUBJECTS: 12 test-wise rhesus monkeys. Four had sustained extensive unilateral (frontal and posterior) destruction of the neocortex plus a contralateral frontal ablation. Four others had a similar unilateral destruction plus a contralateral posterior ablation. Four controls were without injury.

PROCEDURE: Problems consisting of nine pairs of randomly selected objects were presented serially. Each monkey received a different problem for three days. There were ten presentations of a problem. A raisin reward followed a correct choice. At this point, contralateral posterior cortex was removed in animals

having bilateral frontal lesions, and frontal cortex was removed in those having bilateral posterior lesions. Over five months later the monkeys were given five new serial problems. Various tests, including simple (object) discrimination, were administered both before the initial serial learning and in the post-operative period prior to the second serial problems.

RESULTS: In all cases group performance reached at least 85 per cent correct choices. Nonparametric statistical analysis revealed significant differences between the bilateral posterior group and the control group, and, after the additional lesions were made, between the combined operated groups and the control group. Other group comparisons revealed no significant differences. In terms of total errors the additional lesions did not purchase an appreciable increase in the separation of operated and normal monkeys. A comparison of these serial discrimination results with those in simple discrimination suggests that serial discrimination is more difficult and also more diagnostic of brain injury.

CONCLUSION: Those deficits in performance which occurred in the operated animals may have been partly due to an interpair interference effect. It is likely that continued laboratory testing reduces the deficit observed in any particular test.

Slides.

9:25. The effects of area 24 lesions upon visual discrimination and delayed response behavior in the rhesus monkey. R. A. PATTON, C. L. HAMILTON, AND Y. D. KOSKOFF, *Montefiore Institute of Research and University of Pittsburgh*

PROBLEM: The behavior of monkeys with area 24 ablations was compared with that of sham operated controls on object quality discrimination and delayed response learning tasks.

SUBJECTS: Nine mature, male, rhesus monkeys were utilized.

PROCEDURE: All animals in this study had previously learned avoidance conditioning and extinction. The study to be reported here was initiated approximately one year after operation. The operations were made by turning a fronto-central bone flap and gaining access to the dura and cingulate areas through an incision in the dura. The tissue of the anterior portion of the cingulate (area 24) was destroyed bilaterally by electrocoagulation. The animals in the control group were exposed to the same procedures insofar as possible with the exception of the area 24 destruction.

A modified version of the Wisconsin General Test Apparatus was utilized. The problems were run as follows: (a) Six blocks of three-trial, object quality discrimination tests were run with 96 problems per

block. (b) Three blocks of 48 problems each were run with delay periods of 10, 20, and 40 seconds interposed between trials. (c) Forty-eight regular object quality discrimination problems were given. (d) Forty-eight additional delay problems with a 60-second delay interval were presented.

The noncorrection method was used throughout the study with eight problems presented each day.

RESULTS: An analysis of variance using a repeated measures design indicated no significant differences between the experimental and control groups over the first six blocks of 96 problems each. This held for both second and third trial responses. A similar analysis applied to performance during delayed reaction trials showed a similar lack of significance. Although both groups revealed a drop in performance on the delay series, *t* tests using difference scores failed to reveal significant differences. An analysis of covariance was applied to the final 60-second delay interval trials and failed to indicate significant differences between groups on this variable.

CONCLUSIONS: It was concluded that monkeys with bilateral lesions of area 24 did not differ significantly from the sham operated controls on tests of regular and delayed object quality discrimination.

Slides.

Division 5. Test Construction Techniques

8:40-9:40. Comstock Room, Sheraton Palace

ROBERT L. THORNDIKE, Chairman

8:40. The universe. JANE LOEVINGER, *Jewish Hospital of St. Louis*.

Some well-known papers in psychometrics have claimed to make no assumptions or only one or two nonrestrictive ones. Such claims are dangerous, since the assumptions of which one is least aware may be of great consequence for one's results, as Einstein showed in 1905. A class of unacknowledged assumptions relating to the pool of items, often called "the universe," is examined.

The assumption that infinite pools of items exist is contrary to observed fact. The assumption that the experimenter decides in advance of evidence that an item belongs in "the universe," and that this decision cannot be revised after gathering evidence, is contrary to test construction practice and common sense. The assumption that items are randomly selected from an infinite pool is contrary to practice and to sense. The assumption of perfectly homogeneous pools of items evades the unsolved problem of selection of homogeneous items and assessment of degree of homogeneity.

Psychometric theory will increase in usefulness

as its assumptions become more realistic. The following alternative assumptions are proposed:

1. The pool of items is finite.

2. The principle for assembling the pool of items should be different from the principle for selecting items from the pool to comprise a test or subtest. For example, the principle for assembling the pool may be relevance to a broadly defined field or topic; and the principle for selecting items from the pool for a test may be statistical homogeneity. Successive use of two different principles lends conviction to the reality of the traits thus defined.

9:00. The relationship between item difficulty and test validity and reliability. CHARLES T. MYERS, *Educational Testing Service*.

Using freshman average grades as a criterion, this research compares the validity and reliability of part scores based on sets of items selected from a verbal and mathematical aptitude test for college freshmen, the sets having been selected on the basis of their "difficulty." Two parallel sets of 24 items each were selected from the items whose difficulty fell within the limits of 40 per cent passing and 74 per cent passing. Two other parallel sets of 24 items were selected from the items outside this range with one-half the items in each set easy and one-half the items hard.

The subjects were 1,600 freshmen at 12 liberal arts colleges.

For each college a table was prepared of correlations between sets of items and between each set of items and grade averages. The correlations between parallel sets of items were taken as the reliability coefficients. The correlations between average grades and the sums of scores on pairs of parallel sets were taken as the validity coefficients. Thus there were 12 pairs of reliability coefficients and 12 pairs of validity coefficients, one pair of each for each college. The significance of the differences between the two kinds of sets was tested by Wilcoxon's matched pairs signed ranks test.

The sets of medium difficulty items were found to be more reliable at the 2 per cent level of confidence. The mean reliability of these sets of 24 items was .69 while the mean reliability of the other sets of 24 items was .63. However, no significant difference was found for the validities, the mean validity for the pair of medium difficulty sets (48 items) being .49 and the mean validity for the other pair being .51.

9:20. Equating the score scales of alternate forms administered to samples of different ability. RICHARD S. LEVINE, *Educational Testing Service*.

Equations are derived for the equating of score scales of alternate forms when the sample taking one of the forms (X) differs in ability from the sample taking the second form (Y) as a result of nonrandom selection from a common population. The score scale of X is transformed to the scale of Y by means of the following conventional equation:

$$Y = \frac{s_y}{s_x} (X - M_x) + M_y.$$

However, it is not necessary to make the conventional assumption that the s_x and the M_x are, respectively, the standard deviations and means either for the group of examinees that has taken both tests or for two random samples, each of which has taken one of the tests.

For this purpose an additional test, which may be either a set of items contained in both X and Y or a separate test from X and Y , is administered to both samples. Test V must be so constructed that its true scores have a correlation of unity with either X or Y .

It is demonstrated that if true scores on a pair of measures (X and V , say) correlate unity, when samples are selected to differ in mean and variance on variables that correlate with these measures, the following quantities will remain invariant:

1. The ratio of the standard deviation of true scores on X to the standard deviation of true scores on V .
2. The difference between the mean on X and the product of the mean on V and the ratio in (1) above.
3. The variance errors of measurement for both tests.

Because the above quantities remain invariant it is possible to estimate the means and variances that would be observed if the same sample were to take X and Y . These estimated statistics are substituted in the conversion equation.

Experimental evidence concerning the applicability of the method is presented.

Division 5 and Psychometric Society. Symposium: Theory and Experiments on Decision Making

8:40-10:40. Concert Room, Sheraton Palace

DOUGLAS H. LAWRENCE, Chairman

Participants:

WARD EDWARDS. Utility and subjective probability as predictors of risky decisions.

DONALD DAVIDSON. Rationality and decision making.

Discussants:

DOUGLAS H. LAWRENCE AND HOWARD RAIFFA.

Division 7 and 15. Invited Papers: Reports on a Long Term Multifactor Research Program (Guidance Study, Institute of Child Welfare, University of California)

8:40-10:20. Italian Room, St. Francis

JEAN W. MACFARLANE, Chairman

Participants:

READ D. TUDDENHAM. Through time predictive power of physical, intelligence, and behavioral appraisals.

MARJORIE P. HONZIK. Relationships among bio-social, intellectual, and behavioral and personality variables.

JEAN W. MACFARLANE. Multifactor interrelationships in individual life histories illustrative of some group findings.

Discussant: MARIAN RADKE-YARROW.

Division 14. Symposium: The Psychologist in Interdisciplinary Research

8:40-10:40. Empire Room, Sir Francis Drake

FRANK J. HARRIS, Chairman

Participants:

HARRY H. HARMAN. Personal, professional and training requisites.

BERTRAND KLAAS. Problems of intra- and inter-professional communication.

DONALD W. MEALS. Contributions of the psychologist to team research.

G. HAMILTON MOWBRAY. Problems of professional identity.

Films. Therapy and Mental Health

(See listings Friday morning, September 2.)

9:00-12:30. Colonial Room, St. Francis

Division 3. Perception I

9:50-10:50. Room A, Sheraton Palace

RICHARD O. ROUSE, JR., Chairman

9:50. Effect of familiarization with a class prototype on identification learning of shapes. FRED ATT-NEAVE, *Skill Components Research Laboratory, Air Force Personnel and Training Research Center*.

PROBLEM: It has been inferred by Bartlett, Woodworth, Hebb, and others that perceptual schemata

play a central role in the memory for form. Evidence for this view has been almost entirely indirect, however, and much of it is merely anecdotal. The present experiment is an attempt to determine (a) whether pretraining with a nonsense shape "typical" of a class facilitates the subsequent learning of different names for members of the class, and (b) if so, whether the effect is greater when the locus of variation is the same throughout the class (in which case the subject may learn where to look for distinguishing features) than when the variable features are different from one shape to another.

SUBJECTS: 320 airmen basic trainees.

PROCEDURE: Ten "prototype" shapes (5 6-sided, 5 12-sided) were constructed by connecting points with randomly chosen coordinates into polygons. From each prototype two sets of eight variations were derived by moving one third of the vertex points in randomly chosen directions. In the first set (Condition C), the vertices moved were the same for all eight shapes; in the second (Condition R) they were chosen randomly for each shape. Each class of eight shapes constituted the stimuli for a paired-associates learning task. Letters of the alphabet were used as response members. Experimental subjects received pretraining consisting of repeated viewing and reproduction of the prototype of those shapes which they were to learn to identify. Control subjects were pretrained with an irrelevant prototype.

RESULTS: Experimental subjects made significantly ($p < .01$) fewer errors than controls in learning to identify the shapes. This difference was greater ($p < .05$) under Condition C than under Condition R. Familiarity with the class prototype, the "average" shape, apparently enabled subjects to locate more quickly the differentiating characteristics of individual shapes.

Slides.

10:05. A method of generating visual forms of graded similarity. DAVID L. LABERGE AND DOUGLAS H. LAWRENCE, *Stanford University*.

A random visual form can be produced by drawing lines between ten random points on a two-dimensional surface. This form may then be continuously transformed by moving the points in random directions, resulting in a series of gradually distorted forms along one dimension. By rotating the direction of the transformation 90 degrees, a second dimension is produced. In this manner an $n \times n$ matrix of objectively equally spaced stimuli may be generated.

To determine how closely the subjective spacing of the stimuli (in terms of similarity) corresponds to the objective spacing, a 6×6 matrix of stimuli

was generated, each stimulus being printed on a $7" \times 7"$ card. The method of scaling was as follows: the subject was given a row or column of the matrix (6 cards) as "identifiers," by which he was to judge the stimuli of the matrix. When the experimenter presented the stimuli one at a time, the subject indicated which of the identifiers the given stimulus most resembled. It was assumed that the percentage of choices of an identifier for any given stimulus is a measure of the subjective distance between the two. Results on 48 subjects showed that, on the average, the amount of error (variance across six identifiers) increases as a linear function of the objective distance between stimulus and row of identifiers. The same function holds across columns, indicating that, on the average, the spacing between columns is the same as that between rows. To test the generality of this finding and of the method of generating stimuli, 54 subjects were similarly tested on an independent set of 6×21 stimuli. Results are in general agreement with predictions.

The potential usefulness of such sets of stimuli to experiments on transfer will be discussed.
Slides.

10:20. Fatigue and the perceptual field of work.

**GEORGE T. HAUTY AND ROBERT B. PAYNE, USAF
School of Aviation Medicine.**

PROBLEM: The purpose of the investigation was to determine if prolonged attendance to a perceptual field of work would evidence a progressive constriction of this field. Such has been reported in other studies of fatigue but it is not clear whether the process was due to certain psychological factors possibly inherent in the experimental situation or to a gradual impairment of peripheral vision attributable to the hypoxemia which is likely to result from prolonged work.

METHOD: The work task was provided by the USAF SAM Multidimensional Pursuit Test which requires continuous attendance to a collectivity of aircraft instruments that drift randomly from their null positions. The subject's task was to maintain *concurrently* all instruments within their respective ranges of tolerated error by manipulation of aircraft controls. Proficiency was given by the total time per trial that such was accomplished as well as the total time that each individual instrument was maintained at null.

Following 50 min. of training, subjects were required to perform the task for 7 hr. with one interruption consisting of a 15-min. lunch period at the end of the 4th hr.

SUBJECTS: Volunteer, basic airmen.

RESULTS AND CONCLUSIONS: Progressive decrement in proficiency occurred for each instrument but the marginally located instruments exhibited no greater rate of decline than did those located centrally. Since fatigue-induced changes in cellular metabolism are known to effect impairment of peripheral vision, it must be concluded that such impairment did not occur or if it did, it did not occasion a constriction of the perceptual field. Possibly, impairment of this nature is perceived by the individual and compensated for by reversion to earlier and inefficient methods of scanning which bring into direct and sequential view each of the perceptual components making up the field of work.

Slides.

10:35. Figural aftereffects with tachistoscopic presentations. KENNETH BROOKSHIRE AND ALLEN PARDOCCI, *University of Oregon*. (Sponsor, Robert Leeper)

Working from an adaptation-level or perceptual-contrast approach, this experiment tested the general hypothesis that figural aftereffects would be affected by the opportunities provided for the establishment of perceptual norms. The length of exposure of both the inspection and test figures (.25 sec., .75 sec., or 5.0 sec.) and also the length of the interval between the two exposures (3 sec. or 10 sec.) were systematically varied in a $3 \times 3 \times 2$ factorial design. The specific hypothesis was that even with the shorter inspection periods, the usual aftereffects would be obtained when the test exposures were also of brief duration. It was further hypothesized that the tendency toward aftereffect would be an increasing function of the length of inspection but a decreasing function of the length of the test period. The interval between inspection and test was expected to be less significant since opportunity for re-establishing veridical norms during this interval was minimized.

The 36 experimental subjects, college students, were run individually, two being assigned to each of the 18 experimental conditions. The same 12 pairs of figures (each pair including an inspection and a test figure of the type described by Köhler and Wallach) were presented to each of the experimental subjects by means of a Dodge-Gerbrands tachistoscope. Six control subjects judged only the test figures.

Significant aftereffects were obtained for all inspection periods with the .25 sec. and .75 sec. test periods. Analysis of variance indicated that the durations of both inspection and test exposures were significant determinants of aftereffect, the relations between aftereffects and exposure periods being in the expected directions. Neither the interval between

inspection and test nor any of the interactions was significant. A number of failures to obtain aftereffects following such brief inspections have been reported; the present experiment suggests that their appearance depends upon the opportunities for establishing perceptual norms.

Division 3. Brain Function II

9:50-10:50. California Room, Sheraton Palace

MARK R. ROSENZWEIG, Chairman

9:50. *Umweg* behavior in normal and brain-operated cats. HELEN BILLETT, J. M. WARREN, AND J. M. BROOKHART, *University of Oregon*. (Sponsor, J. M. Warren)

PROBLEM: To study the effects of destruction of frontal and posterior association cortex on the performance of cats in a closed-field test of "intelligence."

SUBJECTS: Three groups of postpubescent cats were studied: (a) twelve normal controls, (b) six with lesions in the posterior association area, (c) four with lesions in the frontal association area.

The posterior lesions were confined to the "silent area" lying between the auditory, visual, and somatic projection areas, as mapped by Woolsey. The frontal lesions destroyed the cortical projection of the dorsomedian nucleus, as defined by Rose and Woolsey.

PROCEDURE: The apparatus used was an enlargement of the closed-field "intelligence test" designed by Hebb and Williams and standardized for rats. This apparatus consists of a square enclosed field, with diagonally opposed starting and goal boxes, in which movable barriers are placed in various patterns to constitute the different problems.

In preliminary adaptation trials, each subject crossed the open field until a criterion of directness and consistent speed was reached on two successive days. Each cat was then tested on two problems per day for six consecutive days. Weighted error scores, determined by depth of cul entry, and time scores were recorded for eight trials on each of the twelve standardized problems.

RESULTS: Mean errors for the normal, frontal, and posterior groups were 63, 50, and 131, respectively. The performance of the normal and frontal groups was significantly superior to that of the posterior group at the 1 per cent level of confidence.

CONCLUSIONS: The results of the experiment indicate that performance on this visually controlled task is selectively impaired by lesions in the posterior association area in cat. Similar results have been reported for rat and monkey.

Slides.

10:05. Chronic brain stimulation in monkeys: correlations with autonomic and behavior measures.

DANIEL E. SHEER, DONALD C. KROEGER, WALTER REID, AND NOBLE ENETE, *University of Houston.*

A promising approach in the study of psychophysiological relationships appears to lie in the use of physiological intervention methods which insure a functionally intact organism. In the present study, six coaxial electrodes were inserted in the hypothalamus, thalamus, and rhinencephalon of rhesus macaques. The electrodes are made from 30-gauge insulated stainless steel tubing in which insulated wire is inserted. Two points are polished, one at the tip of the wire and one on the tubing 1 mm. from the tip. The six electrodes, 2 mm. apart, are cemented in a Lucite male cap with twelve prongs and inserted through burr holes with a Johnson stereotoxic instrument. The cap is screwed to the skull with four stainless steel screws. A female cap can be secured to the male cap with a center screw and connected, by means of a flexible twelve-strand insulated lead, to a selector switchbox. Stimulation is in the form of balanced pulse-pairs generated by quasi-differentiating a rectangular pulse and amplifying the resultant with a Williamson type A-C amplifier. Such waveforms appear to produce minimal damage to nerve tissue as contrasted with unidirectional rectangular pulses.

In one situation continuous recordings of skin temperature, EKG, and respiration are carried out during stimulation with a Grass EGG unit through transducer and balance demodulator units. In another situation stimulation is used during a delayed-response testing situation.

Improved performance in the delayed-response situation is related to loci and parameters of stimulation which also show moderate increases on the measures of autonomic function as contrasted with stimulation which produce no changes in autonomic function.

This investigation was conducted under a grant from the National Institute of Mental Health. Slides.

10:20. The acquisition and retention of responses conditioned to faradic cerebral stimuli administered through electrodes shielded by barriers.

ROGER BROWN LOUCKS, *University of Washington.*

Conditioning that is established on the basis of a faradic signal administered to a circumscribed region of the brain makes it possible to study the manner in which neural excitations evoked by the electrical disturbance irradiate from the electrodes. When

neural pathways adjacent to the electrodes are interrupted by implanted barriers, it is possible to draw inferences as to whether the excitatory processes aroused by the faradic signal are conducted by relatively specific pathways or whether they spread over diffuse networks.

The domestic hen has proved to be an excellent subject for such studies because of the precision with which the conditional limb responses can be quantified, and the rapidity with which it can be conditioned to electrical stimuli administered to the occipital region of the brain.

Metal collars placed around the bare tips of the stimulating electrodes, perpendicular to the surface of the brain, appear to have no significant effect on either the speed of initial conditioning or retention. When such barriers are implanted after conditioning has been established, the animals commonly exhibit a strong conditional response on the initial trial of the first postoperative day. The intensity of the electrical signal required to elicit a conditional response, which can be determined very reliably, is commonly unchanged following the implanting of such shields. The insertion of a plate below electrodes which are surrounded by a collar may eliminate a previously established conditional response, but if it passes some distance below the ventral edge of the collar, as shown by X-ray radiographs, conditional responses can sometimes be re-established with a somewhat stronger faradic signal. Whatever the nature of the engram may be, it appears that it can be activated over a variety of pathways irradiating from the cerebral region at which the faradic signal is applied.

10:35. Effect of brain stimulation during black-white discrimination on learning behavior in the white rat. J. A. GENGRELLI AND RALPH MOWER, *University of California, Los Angeles.*

PROBLEM: The purpose of the investigation was to determine whether rate and duration of cerebral stimulation while learning a black-white discrimination problem affects speed of habit formation in the white rat.

PROCEDURE: Four groups of animals ($N = 15$) were used. Three groups were operated surgically and a small receiver unit, activated by a frequency-modulated 420 mc. oscillator, was inserted in each animal. Stimulation was initiated when the animal left the starting box and was terminated after the animal had been in the end compartment for a measured period of time. One group of rats was stimulated at 75 pulses/sec., the second group at 300 pulses/sec.; the third group was not stimulated and served as an operated control; the fourth group was not operated and served as a normal control.

RESULTS: It was shown that the animals stimulated at 300 pulses/sec. as well as those stimulated at 75 pulses/sec. learned faster than the operated controls. The group stimulated at 300 pulses/sec. learned faster than the group stimulated at 75 pulses/sec. It was also shown that differential speed of learning was markedly influenced by varying the duration of stimulation for a given frequency. Increasing the duration of stimulation from five to twenty-five seconds diminished the discrepancy in learning rate between the 75 and the 300 frequency group.

Slides.

Division 5. Studies of Tests and Inventories I

9:50-10:50. Comstock Room, Sheraton Palace

FREDERICK B. DAVIS, Chairman

9:50. A self-concept test: reliability and validity data, ROSE TIPS, DANIEL E. SHEER, GEORGE TAYLOR, MARY E. PHILLIPS, AND GEORGE SALTZMAN, *University of Houston*.

PROBLEM: Fiske isolated five personality factors or source traits, using an orthogonal factor analytic technique, from three independent correlational matrices. The five factors were Social Adaptability, Emotional Control, Conformity, Inquiring Intellect, and Confident Self-Expression. This study reports the development of a self-concept test to measure these five factors using a Q-sort technique.

POPULATION: Tests were given to 260 females and 289 males, with an age range from 16 to 45.

PROCEDURE: From a pool of statements, items were obtained which correlated high with one factor and low with the others. The test consists of 100 cards with a descriptive statement on each card. The subject is required to sort the cards into eight piles from least characteristic to most characteristic with a specified number of cards in each pile. There are ten positive and ten negative statements describing each factor. The pile scores for the negative statements are first reversed, and the score for each factor is the arithmetical total of the pile scores assigned to the twenty statements descriptive of that factor. Standard scores were prepared based on significant age and sex differences. Using the method of equal appearing intervals, a Social Desirability Scale was developed as a control score to detect faking.

RESULTS: Reliability data:

1. Using Kelley's Technique for estimating r 's, item validities ranged from .23 to .87 ($N = 200$).
2. Using the Spearman-Brown method, reliabilities ranged from .89 to .92 ($N = 394$).
3. Intercorrelations between factors ranged from -.06 to .48 ($N = 394$).

Validity data. 1. Correlations with the Guilford-Zimmerman Survey showed high relationships between self-concept test scores and clusters of G-Z factors descriptive of the scores.

2. Using Bales' social behavior measures, subjects high on Social Adaptability, Inquiring Intellect, and Confident Self-Expression were significantly more socially active and socially receptive.

3. High college achievers were reliably higher on Conformity, Inquiring Intellect, and Confident Self-Expression than low achievers.

4. Physical science majors were reliably higher on Emotional Control and Conformity than social science majors.

10:05. Judged social desirability and probability of endorsement of items on the MMPI *Sc* and *D* scales. CHARLES HANLEY, *Michigan State College*.

It has been noted that subjects may be motivated to make socially acceptable responses when taking personality tests. With an inventory of his own design, Edwards showed that judged social desirability of an item is highly correlated with the probability that it will be endorsed (answered "True") in a personality test. The present study employed his approach using a random sample of items from the *Sc* and *D* scales of the MMPI, scales selected because scores on *Sc* require correction by *K*, a measure of tendency to give socially acceptable answers, while no correction is employed with *D*.

Twenty-five (42%) of the items on the *D* scale and 32 (41%) of those on the *Sc* scale were presented to 87 undergraduates who rated every item on a nine-point social desirability scale. Median rating was used to measure an item's social desirability.

Probability of endorsement for items was computed from MMPI's of 106 undergraduates, subjects in an earlier, unrelated investigation.

Items generally were rated as clearly desirable or undesirable, but the *D* sample contained several with neutral ratings. The scoring of *Sc* items more closely follows their judged desirability.

The correlations between desirability rating and probability of endorsement were high: .89 for *Sc* and .81 for *D*.

The rank-order correlation between probability of a pathognomonic response and desirability rating is statistically significant for *Sc*, but virtually zero for *D*. A curvilinear relationship may be involved, subjects tending to give more pathognomonic responses to neutral items.

It is concluded that *D* is less affected by tendency to give socially acceptable responses because it contains more neutral items, and its scoring is less reflective.

tive of social desirability. The use of ratings to devise scales which minimize the relationship is briefly discussed.

10:20. An investigation of the equivalence of two measures of manifest anxiety. RISDON J. WESTEN, *Training Aids Research Laboratory, Air Force Personnel and Training Research Center*. (Sponsor, Arthur J. Hoehn)

PROBLEM: Recent investigations in the areas of learning theory and educational underachievement have made widespread use of a measure of manifest anxiety developed by Taylor, and a forced-choice version of the Taylor scale developed by Heineman. The most recent investigations have tended to use the forced-choice version of the scale, presumably because of its resistance to bias, although relatively little information is available concerning the equivalence of the two scales, or their relative effectiveness in differentiating among the groups of experimental or clinical interest. This study investigates the relationship between two measures of anxiety, and the relationship of both to several measures of defense against anxiety, to two variables which appear to be related to amount of drive, and to an aptitude measure.

SAMPLE: The various scales were administered to a sample of 1,036 airmen who were about to enter an Air Force Technical School.

RESULTS: 1. For the sample study only 62 per cent of subjects high on one anxiety measure were high on the other; only 58 per cent of subjects low on one measure were low on the other.

2. The two anxiety measures do not have the same functional relationships with all of the other variables.

3. Some tentative evidence indicates that Taylor scale scores will correlate more highly with performance on certain kinds of learning tasks than will forced-choice scale scores.

CONCLUSION: The data does not support the hypothesis that the forced-choice anxiety scale is merely a refined version of the Taylor scale.

Slides.

10:35. A method for measuring the degree of reality of different levels of adjustment: a study of the reality of goal-attainment methods. SEYMOUR L. ZELEN, *Patton State Hospital*.

The purposes of this study were to develop a goal-setting situation containing two methods of goal achievement of differing degrees of reality or probability and to determine the effect of level of adjustment on the choice of method.

A schizophrenic, a neurotic, and a normal group were used, each consisting of forty subjects. Each group was equated for age, sex, and education.

Standard level of aspiration techniques were employed, using a modification of the Rotter Board. This modification made use of the two goal methods. One method was to aim for the large target area containing rewards of different values, while the other method had only a single, isolated reward, but it was of greater value than any in the cluster. Successful goal attainment using this isolated method was much less probable than employing the larger target area. This was the objective criterion of the difference in reality between the two methods. A subjective criterion was established by requiring each subject to express these probability differences spontaneously before his inclusion in a group. The frequency of choice of the less real method became the measure employed in this investigation.

Since the data did not distribute themselves normally, a median test was used to determine the significance of the differences between groups. This yielded a χ^2 of 7.80, with 2 *df*, significant at the .025 level. The medians were 4.5, 11.5, and 34.5 for the normal, neurotic, and schizophrenic groups, respectively. Median tests comparing each group with each of the other two groups were all found to be significant.

It may be concluded that there are significant differences in the choice of the reality of the method of goal attainment for these groups. Apparently increasing maladjustment has a direct relationship to the choice of the unreal method.

Slides.

Divisions 7 and 15. Invited Papers: The Adolescent Growth Study; A Follow-up After 16 Years (Institute of Child Welfare, University of California)

10:30-12:00. Italian Room, St. Francis

HAROLD E. JONES, Chairman

Participants:

HAROLD E. JONES. Trends in mental abilities.

MARY COVER JONES. The later careers of the early- and late-maturing.

LOUIS STEWART. Patterns of emotional response in adolescence as related to adult adjustment and psychosomatic illness.

JOHN P. MCKEE AND ELSE FRENKEL-BRUNSWIK. Motivational patterns in adolescence as related to adult personality.

Discussant: D. P. AUSUBEL.

Division 3. Perception II

11:00-12:00. Room A, Sheraton Palace

ROBERT M. GOTTSDANKER, Chairman

11:00. Transposition in preverbal children. HAROLD W. STEVENSON, TED LANGFORD, AND HAYNE REESE, *University of Texas.*

PURPOSE: The results of two studies on the transposition responses of preverbal children are reported. The general hypothesis tested is that conditions which increase the difficulty of discriminating between the sets of training and test stimuli will result in increased transposition. The ease of discriminating between the sets of stimuli was varied by using immediate and delayed testing and by using test stimuli which differed in brightness and size from the training stimuli.

SUBJECTS: The subjects were 94 nursery school children of ca. 3-0 to 3-11.

MATERIALS: The stimuli consisted of a set of six white blocks and a set of six gray blocks. Within each set the size ratio of successive blocks was 2:1. The areas ranged from 32 to 1 sq. in. The blocks were presented on a black tray. Animal and flower stickers were the rewards.

METHOD: All subjects were trained on the two largest white stimuli. A choice of the smaller of the two was rewarded. In the first study only the set of white stimuli was used. Half of the subjects were tested immediately and half after a delay of 24 hr. In testing for transposition a choice of the smaller stimulus was again rewarded. Tests were made for the sets of stimuli one to four steps removed from the training set and testing continued until four successive correct choices of the smaller stimulus were made. In the second study the subjects were tested immediately after training on gray stimuli that were identical in size to the white training stimuli, and which were one and two steps removed from the training stimuli.

RESULTS: A time lapse of 24 hr. between training and testing resulted in an increase over immediate testing in the frequency of transposition. A transposition gradient such as that found in previous experiments appeared in both groups of the first study; however, its slope was steeper for the subjects tested immediately after training. The use of darker test stimuli consistently resulted in less transposition than did the use of training and test stimuli on the same brightness dimension.

Slides.

11:15. The basis of solution by children of the intermediate size problem. KOJI SATO AND YOSHIO NISHIJIMA, *Kyoto University and Aichi College of Education.* (Sponsor, C. H. Graham)

PROBLEM: (a) To compare the experiments by Spence and Bitterman on the intermediate size problem and analyze the conditions for their different results.

(b) To test further the theory of transposition which Sato presented in Japan in 1936.

SUBJECTS: Exp. 1. Test of Spence's experiment. Intermediate size discrimination followed by tests with the positive stimulus in the test stimuli as in Spence. Exp. 1a. Comparison of the transposition at the upper and the lower ends of the stimulus continuum with that at the middle region. Exp. 2. Test of Bitterman's experiment. Intermediate size discrimination followed by tests without the positive stimulus and interspersed among the training trials as in Bitterman. Exp. 2a. Identical tests as in Exp. 2 above, but not interspersed among the training trials. Exp. 3. Tests in Spence's and Bitterman's design with the same subjects and the same training trials.

RESULTS: 1. With the positive stimulus in the test, the significant dominance of the absolute response was recognized as in Spence (Exp. 1), but in the upper and lower ends the dominance tends to be insignificant. 2. In Exp. 2 the relational response dominated as in Bitterman's experiments, but the interspersion of the tests in both directions with the training trials was not the necessary condition for that dominance (Exp. 2a). 3. With the training, the possibility for both the absolute and the relational responses increased (Exp. 3). This fact, together with the above findings, which conform with both Spence and Bitterman's results, are interpreted in the line of Sato's theory, which emphasizes the role of selective response set and the differentiation of the absolute and the relational responses with the mental development in general.

11:30. Visual deprivation and the learning of a brightness discrimination problem. WALLACE R. McALLISTER, *Syracuse University.*

PURPOSE: To investigate the effects of visual deprivation upon the learning of a brightness discrimination problem.

SUBJECTS: 40 pigmented rats were used; 20 were raised normally; the remainder, from the seventh day of life, in total darkness.

APPARATUS AND PROCEDURE: The apparatus consisted of a starting alley, a gray choice chamber, and the discriminanda which were alleys of different brightness (black or white).

Preliminary training, in which each subject, 22 hours thirsty, was run down a straightaway a total of 24 trials to a water reward, was conducted in total darkness for both groups. On each day during the experiment proper the normal subjects were dark adapted for two hours before being run in the brightness discrimination problem. Ten trials a day were run with the subjects 22 hours thirsty to a criterion of 18 out of 20 correct choices (original training).

Half the subjects had white as the positive stimulus, the rest, black. Choice of the positive stimulus resulted in attainment of a water reward; choice of the negative stimulus, in nonreinforcement. On the day following the attainment of the criterion each subject continued to be run with the discriminanda reversed in significance (reversal training). The visual experience of the visually deprived animals was limited to the training trials.

RESULTS: Ophthalmological examination revealed no impairment of the visual apparatus of visually deprived subjects. In original training, the visually deprived animals took significantly more trials (1% level) to reach the criterion of learning regardless of whether black or white was positive. In reversal training, the visually deprived animals again took significantly more trials to reach criterion (5% level). These results indicate that visual deprivation slowed down the learning of the brightness discrimination problem.

Slides.

11:45. The influence of early visual and motor experience on learning a complex closed-field maze with and without "extramaze" visual cues. RONALD H. FORGUS, *University of Pennsylvania*.

To study one of the central issues in Hebb's theory, viz., the *relative* effects of early *visual and motor* experience on complex maze learning, 28 hooded rats were divided into two equal groups. The "Visual-motor" Group was reared in a diversified environment which afforded much opportunity for complex visual-motor experience. The "Visual" Group was reared in a similar environment, allowing much opportunity for visual experience, only. When they were approximately 85 days old, the rats were required to learn an eleven-unit closed-field T maze.

The preliminary test consisted of one trial per day for 10 days. At each choice-point there were two light cards through which the animal could easily push. The correct and incorrect cards contained horizontal and vertical striations, respectively. At the end of the eleventh correct choice, the animal, which had been food-deprived for 23 hours, received food. By the tenth day all animals reached a preliminary criterion of two or less errors on two consecutive trials.

The critical test, from the eleventh trial on, was conducted with all these visual-aid cards removed. Each animal was run until he reached the criterion of two consecutive errorless trials. Olfactory and auditory cues were controlled.

The mean number of trials to reach the preliminary test criterion was 6.43 and 7.36 for the "Visual-motor" and "Visual" Groups, respectively. The difference was not significant ($p > .1$). The mean num-

ber of trials to reach the critical test criterion was 19 for the "Visual-motor" Group and 26 for the "Visual" Group. The difference was highly significant ($p < .001$). Analysis of the error scores gave similar results.

Linking these findings with two earlier reports by the author, it is concluded that the effect of early visual and motor experience on adult problem-solving behavior depends on the relationship between the kind of early experience and requirements of the problem.

Slides.

Division 3. Brain Function III

11:00-12:00. California Room, Sheraton Palace

ROBERT A. PATTON, Chairman

11:00. Deterioration of word meanings in aphasia. H. GOODGLASS AND M. COHEN, *Boston VA Hospital*.

PROBLEM: Injury to the organic substrate for language comprehension in aphasics renders their auditorily perceived words partly or totally meaningless. Clinical observation suggests that the most frequently used and the most emotionally significant words are best understood by receptive aphasics. In addition, observation of patients' errors in understanding indicates that individual words deteriorate in meaning within the framework of a more general field of meaning. This study was designed to test some hypotheses arising from the clinical observations described.

PROCEDURE: 48 stimulus words referring to external body parts were presented orally to 20 male aphasics who had significant auditory receptive impairment. The subjects were instructed to point to the part of their bodies which they heard named. The part to which they pointed was recorded as the response.

HYPOTHESES AND FINDINGS:

Hypothesis 1. Auditory recognition of body part names after brain injury is a function of (a) frequency of general use of the stimulus word, (b) emotional significance of the word, (c) psychological properties of the general body area (head, trunk, etc.) in which the part named is located.

Finding: Frequency of use and emotional significance of the stimulus words were highly related to retention of meaning. Accuracy of recognition was not related to the general body area of the stimulus word.

Hypothesis 2. Errors in identifying the spoken word tend to occur within the same field of meaning as the stimulus word; i.e., subjects will usually point to some part of the general body area in which the part named is located.

Finding: This hypothesis was confirmed.

Hypothesis 3. Response errors occurring outside of

the general area of the stimulus word will tend to congregate in emotionally significant body areas, such as head or genital regions.

Finding: This hypothesis was not supported; instead, there was a significant tendency for grossly erroneous pointing responses to congregate in the torso or lower limbs.

11:15. Complex visual task performance after penetrating brain injury in man. SIDNEY WEINSTEIN, HANS-LUKAS TEUBER, LILA GHENT, AND JOSEPHINE SEMMES, *Psychophysiological Laboratory, New York University—Bellevue Medical Center.*

It is generally conceded that brain injury in man may produce deficits on complex visual tasks (sorting tests, conditional reaction, etc.), but surprisingly little information exists on the nature of the impairment, particularly its relation to other changes in function. We therefore asked the following questions. Is deficit on complex visual tasks restricted to groups with primary sensory defect in the same modality (visual field defect)? Is this deficit related to other sequelae of cerebral lesion (aphasia, epilepsy, intellectual impairment, tactile defect)?

The experimental group comprised 136 men with penetrating cerebral trauma established by roentgenographic record and surgical exploration; 75 men with peripheral nerve injury served as controls. The tests consisted of "abstraction," match-from-sample, conditional reaction, and sorting tasks.

1. The group with visual field defect was not significantly impaired on any test, nor was the group with epilepsy. 2. Aphasics were significantly inferior to controls and nonaphasic brain-injured on the conditional-reaction test. 3. Surprisingly, two measures of tactual defect were associated with impairment on the visual tasks. The group with defective point localization was significantly inferior to all other groups on visual abstraction; those with defective two-point discrimination showed deficit on match-from-sample. 4. None of the above differences reflect general intellectual impairment, since they remained after eliminating effects of differences in intelligence. 5. The brain-injured were significantly inferior to controls on the sorting task, but analysis of covariance indicated that this difference could be attributed to differences in general intelligence.

In conclusion, brain injury can produce deficits in complex visual tasks in the absence of primary visual field changes, and independently of intellectual impairment. The results further suggest that these deficits are most likely to occur after lesions which implicate certain aspects of language or somatosensory function.

Slides.

11:30. Tactile discrimination after unilateral brain injury in man. LILA GHENT, JOSEPHINE SEMMES, SIDNEY WEINSTEIN, AND HANS-LUKAS TEUBER, *Psychophysiological Laboratory, New York University—Bellevue Medical Center.*

We have previously demonstrated that brain-injured men show impairment, 10 years after injury, on complex tactile tasks. We therefore asked whether persistent deficit also appears on tactile discriminations. If impairment exists, is it related to alterations in other functions?

The experimental group comprised 39 men with penetrating, unilateral brain injury; the control group comprised 20 men with leg injuries. Three tactual discrimination tests were used: tridimensional form, bidimensional pattern, texture. Except for the pattern task, the subject was allowed unlimited time to feel the sample and select the matching object from a comparison array.

On all tasks the control group surpassed the brain-injured group. Performance was not correlated with intelligence in either group. Analyses according to locus of lesion did not reveal significant differences between brain-injured subgroups.

However, a group with somatosensory defect showed significantly lower scores on all tasks than a group without such defect. In the sensory defect group, the hand ipsilateral to the injury, as well as the contralateral hand, showed significantly lower scores than the comparable hands of the brain-injured group without somatosensory defect.

Aphasia and epilepsy were not related to performance on the form and texture tasks. On pattern, the contralateral hands of epileptic and nonepileptic groups showed impairment. In addition, the ipsilateral hand of the epileptic group was significantly inferior to that of the nonepileptic and control groups. This defect was not the result of a greater proportion of men with somatosensory defect in the epileptic group.

Thus, impairment in tactile discrimination was found even 10 years after brain injury in man. This impairment appeared primarily in a group with somatosensory defect, but the results suggest that sensory defect alone could not account for the impairment. Our findings also indicate that epilepsy, in a unilaterally brain-injured group, may be associated with bilateral dysfunction.

Slides.

11:45. General and specific effects of cerebral lesions. HANS-LUKAS TEUBER AND SIDNEY WEINSTEIN, *Psychophysiological Laboratory, New York University—Bellevue Medical Center.*

Earlier work on effects of cerebral lesions in animal and man has stressed either of two alternatives: (a) a general impairment, independent of locus of lesion; or, (b) specific symptoms tied to a given locus. We have data supporting a less dichotomous view. Lesions which produce focal changes within a sensory system also affect certain other functions throughout this system, and these alterations in turn are accompanied by still more general deficits which occur with injury in any lobe. The present report demonstrates such hierarchical findings for visual performance.

SUBJECTS: 64 men with penetrating brain injury and 43 with peripheral nerve injury (controls).

PROCEDURE: All men participated in earlier studies involving: visual field tests, tests of somatosensory and motor functions, and assessment of language status. Each man was given a hidden-figures task (after Gottschaldt).

RESULTS: Three types of symptoms were found: (a) Specific involvement of visual fields (24 patients) in form of circumscribed scotomata. (b) In these patients alone there were subtle but systematic changes elsewhere in the visual field (e.g., lowered flicker fusion). (c) All brain-injured groups, irrespective of locus of lesion, were significantly inferior to the controls on the hidden-figures task. Appropriate analyses of variance showed that this inferiority existed irrespective of presence or absence of visual field defect or epilepsy. However, aphasics were surpassed by nonaphasic brain-injured (.01 level), and nonaphasics were, in turn, surpassed by controls (.01 level). These differences were maintained, when effect of present intellectual level was eliminated by analysis of covariance.

CONCLUSIONS: Some dysfunctions (scotomata) were specific and circumscribed; others (lowered flicker fusion) existed in the presence of scotoma, but involved the entire visual field. Still others (impairment on hidden figures) existed irrespective of location of lesion, and presence or absence of other symptoms, thus indicating a general deficit.

Slides.

Division 14. Invited Address

11:00-12:00. Empire Room, Sir Francis Drake
 RALPH W. TYLER, Director, Center for Advanced Study in the Behavioral Sciences. *Research Developments in the Behavioral Sciences.*

Division 5 and Psychometric Society. Symposium: Multivariate Analysis

11:00 A.M.-1:00 P.M. Concert Room, Sheraton Palace
 PHILLIP J. RULON, Chairman

Participants:

S. N. ROY. Multivariate confidence bounds.
 PAUL HORST. Practical applications.
 PHILLIP J. RULON. Theoretical issues.

MONDAY AFTERNOON, SEPTEMBER 5

Luncheon for Group Psychotherapy Association of Southern California

12:00-2:30. Room 2127, Sheraton Palace.

Division 10. Luncheon, Business Meeting, Presidential Address, and Invited Address

12:00-3:40. Room 210, St. Francis

RUDOLF ARNHEIM, Chairman

Presidential Address. CARROLL C. PRATT.

Invited Address. STEPHEN C. PEPPER. *Experimental Gaps in Psychological Aesthetics.*

Business Meeting of Publications Board, APA

1:30-3:30. Room 212, St. Francis

Divisions 1 and 7. Symposium: Effects of Early Visual Experiences

1:30-3:30. Italian Room, St. Francis

JAMES J. GIBSON, Chairman and Discussant

Participants:

ELEANOR J. GIBSON. The effect of early exposure to visual shapes on discrimination learning in adult rats.

AUSTIN H. RIESEN. The development of spatial vision in the chimpanzee.

ROGER SPERRY. Some inherited features of visual organization.

Division 2. Symposium: Personal Bases for Judgment of Success as a Teacher of Undergraduate Psychology

1:30-3:30. Borgia Room, St. Francis

WILBERT S. RAY, Chairman

Participants: B. VON HALLER GILMER, DAVID A. GRANT, J. McV. HUNT, J. E. CASTER, AND ROBERT I. WATSON.

Division 3. Animal Learning I

1:30-2:30. California Room, Sheraton Palace

DOUGLAS H. LAWRENCE, Chairman

1:30. Relative effectiveness of start-box and goal-box cues in the maintenance of avoidance responses. HARRY BENDER, *University of Colorado.*

PROBLEM: Within a drive-reduction theoretical framework, avoidance responses may be conceptualized as being related to the drive-evoking qualities of the avoided stimuli, or the drive-reducing qualities of the stimuli contingent upon making the avoidance response, or both. Either or both secondary drive and secondary reward may affect the strength of the avoidance response. The experiment was designed as a preliminary attempt to isolate the effects of these variables.

SUBJECTS: 72 male albino rats.

PROCEDURE: Start and goal boxes were varied systematically during test trials following a series of escape and avoidance trials. For one experimental group, the start-box cues were changed during the test trials. For another experimental group, the goal-box cues were changed. For a control group, both start and goal cues were the same as those present during original training. The nature of the design insured the equivalence of stimulus changes in start and goal boxes for the two experimental groups.

RESULTS: Both start and goal cues were demonstrated to contribute toward the maintenance of the avoidance response. The start-box cues, however, proved to be of greater significance in determining the strength of the response.

CONCLUSION: Various theoretical implications of the results were explored. In part, the results were interpreted as suggesting the operation of both secondary drive and secondary reward in avoidance learning, with the effects of secondary drive being more pronounced.

Slides.

1:45. Extinction following partial and varied reinforcement. **FRANK A. LOGAN, EILEEN M. BEIER, AND WENDELL D. KINCAID, Yale University.**

PROBLEM: Partial reinforcement, which typically results in an increase in resistance to extinction, confounds the effects of varied delay and varied magnitude of reinforcement. The present studies observed the effect on rate of extinction of these two operations separately.

SUBJECT: 87 black hooded rats, run one trial/day in a 4-ft. straight alley.

PROCEDURE: A varied delay group received a 1-sec. delay on half of the trials and a 9-sec. delay on the remaining half. A varied magnitude group received a 9-pellet magnitude on half of the trials and a 1-pellet magnitude on the remaining half. For both of these experimental groups, two control groups were run: one receiving the mean of the two values for the varied groups, and the other the preferred of the two values. A second varied magnitude group was

later run, with a partial reinforcement group substituted for the mean control group.

RESULTS: No difference in rate of extinction was found between the varied delay and its two control groups. Results of the first varied magnitude experiment offered unreliable evidence that varied magnitude increases resistance to extinction. This was corroborated significantly in the second varied magnitude study, where the varied magnitude and partial reinforcement groups did not differ in resistance to extinction but both exceeded the mean control group.

DISCUSSION: The assumption is made that extinction is most rapid for subjects who persist in making the fractional anticipatory goal response (r_g) on extinction trials even after the regular time of reinforcement has passed. Under this analysis, certain training conditions provide for extinction of r_g to these postreinforcement-time cues. We predicted that varied delay will increase resistance to extinction only if the difference in delays is relatively large. This prediction was confirmed by a subsequent experiment.

2:00. The effects of partial reinforcement and stimulus generalization on resistance to extinction.

EVERETT J. WYERS, University of Southern California. (Sponsor, William W. Grings)

PROBLEM: With massed trials partial reinforcement enhances resistance to extinction. One hypothesis accounts for this by assuming that reinforcement and nonreinforcement produce characteristic aftereffects. These function as stimuli during the following trial. Extinction is slower after partial reinforcement because such nonreinforcement stimuli are common to training and extinction. With spaced trials the after-effects dissipate. The experiment utilizes spaced trials and replaces the hypothetical effects with objective stimuli. It tests four deductions. (a) With the starting stimulus constant, partial reinforcement should not enhance resistance. (b) Varying the starting stimulus should take the place of the aftereffects and increase resistance. (c) Common stimuli between training and extinction should slow extinction. (d) If stimuli are held in common, proportion of reinforcement should not affect extinction differentially.

SUBJECTS: 75 rats.

PROCEDURE: The subjects learned a runway response. The alley was gray. There were 30 trials (15-minute interval). Group W had a white starting box. Group B had a black one. Group WB had white on 15 randomly selected trials, and black on the remainder. Each group consisted of two subgroups. Group 100 received uniform food reinforcement.

Group 50 received 50 per cent random reinforcement. All groups received 30 spaced extinction trials with a black starting box.

RESULTS: Two predictions were confirmed. (a) Group 50 (W and B) did not differ from group 100 (W and B). (b) Group 50 WB extinguished significantly slower than group 100 W. Two predictions were not confirmed. (c) Group B did not demonstrate greater resistance than group W. (d) Group 50 WB demonstrated significantly greater resistance than Group 100 WB.

CONCLUSION: The results suggest that the joint action of two factors is necessary to the effect of partial reinforcement on resistance to extinction; (a) a common training and extinction stimulus, and (b) unsystematic reinforcement during training.

2:15. Extinction as a function of partially delayed reinforcement and trial distribution. EDWARD L. WIKE AND EARL D. SCOTT, *University of Kansas*.

PROBLEM: To determine whether or not the acquisition and extinction of an instrumental response is independent of: (a) partially delayed reinforcement, (b) trial distribution during training, and (c) trial distribution during extinction. The purpose of the investigation is to assess the applicability of the Hull-Sheffield stimulus-generalization theory of partial reinforcement to the results of an earlier experiment by Crum, Brown, and Bitterman in which it was found that partially delayed reinforcement led to greater resistance to experimental extinction.

SUBJECTS: 48 hooded, female rats.

PROCEDURE: Half of the subjects were trained to traverse an elevated runway under massed trial conditions and half under spaced trials. Half of the subjects in each subgroup received partially delayed reinforcement and the other half experienced immediate reward on every trial. After 10 days of training, the four groups were split with half of the subjects undergoing massed extinction trials and the remaining half spaced trials.

RESULTS: There were no reliable differences in log running times at the termination of training, but the partially delayed reinforcement groups ran significantly faster in extinction ($p < .05$). When the performance level at the end of acquisition was controlled statistically, the difference in extinction between the partially delayed and immediately reinforced groups was enhanced ($p < .02$).

CONCLUSIONS: Since the distribution of trials in acquisition had no effect upon the resistance to extinction, it is concluded that neither the earlier findings of Crum, Brown, and Bitterman, nor the present

results can be interpreted in terms of the Hull-Sheffield theory of partial reinforcement. The superior performance of the partially delayed reinforced subjects confirms the previous findings of Crum, Brown, and Bitterman. And finally it is concluded that the effects of partially delayed reinforcement constitute a paradox for behavior theory of the same sort as that arising from the application of partial reinforcement.

Slides.

Division 3. Perception III

1:30-2:30. Room A, Sheraton Palace.

JOE K. ADAMS, Chairman

1:30. The accuracy with which accelerated motion may be identified. ROBERT M. GOTTSANKER, *University of California, JAMES W. FRICK, University of Southern California, AND ROBERT B. LOCKARD, University of California, Santa Barbara College*.

PROBLEM: To determine the accuracy with which accelerated paths of target motion may be identified by adult human subjects as a function of extent of acceleration and time of exposure.

SUBJECTS: 160 college students, men and women.

METHOD: The task given the subjects on 100 trials was that of judging whether the first or second of two runs of a moving target was accelerated. Targets were presented by projecting a motion picture which had been made by the technique of animation.

The ranges of values employed were: 0.26 to 67.60°/sec. for rate; 13.75 to 440.00%/sec. for relative acceleration; and 0.45 to 3.64 sec. for exposure time. Accelerated runs had a parabolic relation between time and position; both positive and negative acceleration were used.

RESULTS: Functions were obtained relating the number of correct responses to extent of acceleration and time of exposure. With maximum exposure time the minimum relative acceleration of 13.75%/sec. gave performance far above the chance level. A similar level of performance with the shortest exposure time required a relative acceleration of over 400%/sec. Negative acceleration was more easily identified than was positive acceleration. There were no significant differences when accuracy on longer runs was compared with that on shorter runs. Likewise little difference was found between trials against a homogeneous background as compared with those in which landmarks were crossed.

CONCLUSIONS: (a) Both extent of acceleration and time of exposure are important determiners of the

number of correct responses. (b) Although there were more correct responses for negative than for positive acceleration, it is possible that this was due to the specific conditions of the experiment. (c) Extent of movement and structure of the background did not emerge as significant factors. (d) The extremely poor performance at the shortest exposure time indicates that the identification of acceleration is largely based upon the comparison of rates rather than upon a direct impression of acceleration. Slides.

1:45. Extrapolations from straight lines and arcs.

RICHARD O. ROUSE, JR. AND ARTHUR JENNESS,
Williams College.

Perception of lines at various angles with the vertical has been studied extensively, but extrapolation of lines has received less attention. In a situation simulating prediction of future positions of moving targets from limited track histories, the relative influence of 10 variables was investigated. Track histories (straight lines and arcs 3 ft. wide) of various lengths and angular placement were viewed on a 25° circular flat vertical display from a distance of 5 ft. Nine subjects observed binocularly with head position fixed, indicating estimates of extrapolations at controlled intervals by means of a movable dot. Conclusions are based on four analyses of variance.

The influence of four extrapolation distances, five lengths, four starting positions, and seven tilts was significant for extrapolations from single straight lines. Extrapolation distance and mean systematic error were related in an accelerated function. Variability (SD) increased linearly with extrapolation distance. Increase in length of track produced a decelerating decrease in error and variability. Starting position had negligible effect on variability, but caused errors to vary in direction. Variation associated with tilt increased up to 45°, then decreased. Increasing the diameter of arcs reduced both error and variability. Other functional relationships were generally the same with arc data as with straight line data, though errors were somewhat larger with arcs. Extrapolating arcs as arcs, rather than as straight lines, produced similar results. Number of tracks on the display had no general effects. Judgments on complex tracks were based on only the last part of the line displayed. Training (knowledge of results) did not produce transferable improvement.

In general, subjects tended to bend extrapolations toward the vertical or horizontal, whichever was nearer.

This research was sponsored by the Human Fac-

tors Office of the Rome Air Development Center, under Contract AF30(602)-666. Slides.

2:00. Factors in the solution of bent-wire detour problems by monkeys and chimpanzees. ARNOLD A. McDOWELL AND ROGER T. DAVIS, *The University of South Dakota, and Henry W. Nissen, Yerkes Laboratories of Primate Biology.*

2:15. The effect of induced muscular effort on visual form discrimination learning. SYLVIA R. MAYER, *Boston University Optical Research Laboratory.*

PROBLEM: The effect of induced muscular effort on visual form discrimination learning was examined. Comparisons were made of the effects of different kinds of effort: (a) effort induced by motor responses unrelated in pattern to the visual training form, i.e., dynamometer performance, and (b) effort induced by motor responses related in pattern to the visual training form, i.e., Tracing and Drawing; and different amounts of effort, i.e., various degrees of dynamometer pressure.

SUBJECTS: 28 men ranging in age from 22-40 years were randomly selected from among laboratory personnel. All were right-hand dominant and had 20/20 vision.

METHOD: The counterbalanced design used required the subject to memorize the structure of targets in seven effort conditions: (a) performing on the dynamometer at 0, (b) $\frac{1}{8}$, (c) $\frac{1}{4}$, (d) $\frac{1}{2}$, (e) $\frac{3}{4}$ of his maximum grip strength, (f) tracing each target, and (g) drawing each target. Time was equal for all conditions. The seven equated target sets consisted of 10 abstract forms each. Training sessions were followed by 10-minute rests after which the subject was required to discriminate from among similar test objects each target which he had learned.

RESULTS: Maximum discrimination proficiency for all conditions occurred with Drawing; discrimination proficiency decreased with increased dynamometer-induced effort. In addition this study indicated that the effect of induced effort may vary with (a) the degree of complexity of the task: discrimination of targets with simplest structures approximated the traditional facilitation curve; (b) individual ability in this perceptual task: performance of the lowest scorers was progressively facilitated by increases in dynamometer-induced effort.

Examination of the different visual-motor features in the seven experimental conditions led to the conclusion that the extent to which facilitation of visual discrimination learning can be expected from induced

effort during training depends on the amount of skill required in the performance of the effort-inducing activities.

Graphic materials will be presented on mimeographed handouts.

Division 5 and Psychometric Society. Pattern Analysis

1:30-2:30. Comstock Room, Sheraton Palace

JOSEPH ZUBIN, Chairman

1:30. Some theorems on the use of pattern scoring for predicting quantitative criteria. ARDIE LUBIN, *Army Medical Service Graduate School, Walter Reed Army Medical Center*, and HOBART G. OSBURN, *Human Resources Research Office, George Washington University*.

What is the best possible way of predicting a quantitative criterion from answer patterns? If a minimum sum of squared errors of prediction is the desired result, the least-square approach will give us the answer: compute the average criterion score for all subjects with the same answer pattern and assign it to each subject as his predicted score. This set of answer pattern averages will be called a "configural scale."

If t dichotomous items are used, there will be 2^t possible answer patterns for such a test. The configural scale will consist of 2^t averages.

From this definition of the configural scale, a number of theorems can be derived which show that, in most situations, the configural scale is the best possible way of scoring the answer patterns. Although the theorems are stated in terms of dichotomous items, the conclusions are essentially the same when more choices are used per item.

THEOREM I: The zero-order correlation of the configural scale with the criterion is equal to or greater than the correlation of the criterion with any other set of scores based on the answers to the t dichotomous items.

THEOREM II: The configural scale is equivalent to a t^{th} degree polynomial function of the t item scores.

$$\hat{C} = b_0 + \sum_{i=1}^t b_i X_i + \sum_{i,j} b_{ij} X_i X_j + \sum_{i,j,k} b_{ijk} X_i X_j X_k + \dots$$

where X_i , the score for the i^{th} item, is unity or zero; \hat{C} is the predicted criterion score; and the b 's repre-

sent the coefficients for each of the 2^t terms in the polynomial.

THEOREM III: Whenever the number of empty answer patterns for t items is g , then the number of terms in the polynomial equation will be $2^t - g$.

COROLLARY: When the number of filled answer patterns is $(t+1)$ or less, the best predictor is a linear multiple regression function of the t items.

From this it follows that, contrary to Guttman's view, the scale scores of a perfect Guttman scale are not "an invariant quantification of the attributes for predicting any outside variable whatsoever."

If the distribution of criterion scores within each answer pattern is normal or unimodal symmetric, F -ratio tests can be made for the validity of the configural scale, the number of significant items in the configural scale, the significance of any term in the polynomial equation, the linearity of the polynomial, etc.

1:45. A probability: theoretical solution of the Meehl configural scoring paradox. JAMES K. YARNOLD, *University of Illinois*. (Sponsor, C. F. Wrigley)

It is demonstrated that there exists, in the mathematical theory of probability, a theoretical basis justifying the need felt by clinical and other applied psychologists for the use of "patterns" of test scores in psychological prediction. This need has been expressed most often in cases where no one of a set of n random variables, perhaps test scores, predicts a criterion, but where it is nevertheless felt by experienced psychologists that certain combinations of values of $k > 1$ of these n random variables, or "score patterns," do predict the criterion.

In fact, Meehl has recently published an example in which neither one of two dichotomous test items predict a dichotomous criterion, but in which the two items taken jointly do predict the criterion. However, he seems to consider this example paradoxical. He states in "Clinical vs. Statistical Prediction" that "Probably the most striking instance of patterning is a situation in which neither variable is related to the criterion, and yet the criterion is predictable to some degree from a knowledge of the values these two variables take on. I am not talking here about the familiar cases which appear paradoxical only because the Pearson r is used as the indicator of a relationship to which it is unsuited. I mean unrelated in the strict, general mathematical sense of independence as it is defined in probability theory. If variables x and y are both totally independent of a criterion z , is it possible to predict z from a knowledge of x and y alone?" It is shown that the answer

to Meehl's question is either (a) "Yes" or (b) "No," depending upon whether by "totally independent" he means (a) pairwise independence, or (b) complete independence. The question and its answer is generalized to $m + k$ random variables, where these random variables are interpreted to be m tests and k criteria.

2:00. An empirical evaluation of methods for estimating profile similarity. GERALD C. HELMSTADTER, *Educational Testing Service*.

PURPOSE: The purpose of this study was to compare, under known conditions, the accuracy of 21 currently espoused methods for assessing the similarity of test profiles when used to classify individuals into known groups.

PROCEDURE: Artificial data were set up to represent a typical counseling situation in which an individual profile is compared with the average profiles of several known groups. Nine "measurements," including both discrete and continuous variables and having reliabilities ranging from .00 to .70, were made on each of 270 subjects. From this population, a random sample of 60 subjects from each of three known groups was drawn and used to obtain the reference profiles and other constants required for the similarity indices. Each of the nine methods for estimating the similarity of profiles which ultimately proved to be algebraically distinct was then used to classify each of the remaining 90 subjects into one of the three groups. Finally, the proportion of correct classifications was determined for each method, and comparisons were made among the techniques as well as with chance expectation and with the two control procedures of linear discriminant function and subjective judgment.

RESULTS: While all of the techniques did better than would be expected by chance, an over-all test of significance indicated that there were differences among the methods with respect to the accuracy of classification. Individual comparisons suggested, however, that this result was largely due to one admittedly rough approximation which was significantly inferior to all of the techniques except product-moment correlation, Cronbach-Gleser index with elevation removed, and subjective judgment.

2:15. Comparisons of profile analyses of Rorschach data. MARILYN K. RIGBY, WALTER L. WILKINS, AND O. F. ANDERHALTER, *St. Louis University*.

PROBLEM: The exploration of statistical methods of handling Rorschach subscores for prediction purposes. A combination group-individual administration

of the instrument was used as a part of a wide-ranging assessment battery, one purpose of which was to predict success in an officer screening course and in subsequent officer training.

SUBJECTS: Two groups of 200 men each, the upper group consisting of a sample of officers who, as enlisted men, had been recommended for commissioning in the screening course and, as officers, had received leadership grades of at least 90 in their six months of training following commissioning. The lower group was composed of 200 enlisted men who had failed to be recommended for a commission at the end of the screening course.

PROCEDURE: The upper and lower groups were randomly split in half to provide cross-validation data for the profile scoring systems. The statistical methods applied successively were Q analysis, tests of flatness and elevation, Cronbach and Gleser's \bar{D} with and without a measure of direction, and the linear discriminant function. The last-mentioned technique was applied to the eleven most reliable and independent of the scoring categories.

RESULTS AND CONCLUSIONS: The linear discriminant function yielded the highest validity on cross validation of the techniques applied. The estimated product-moment correlation with the criterion on the independent sample was between .5 and .6. The only other technique found useful was Cronbach and Gleser's \bar{D} with a direction measure. The results from the other techniques failed to be maintained upon cross validation. The discriminant analysis was relatively inexpensive and has the additional advantage of yielding weights that can be applied to raw Rorschach scores.

The research was conducted under contract with the Office of Naval Research.

Division 14. Symposium: Psychology in Advertising and Advertising Research

1:30-3:30. Empire Room, Sir Francis Drake

PAUL S. ACHILLES, Chairman

Participants:

ROBERT N. McMURRY. Preconscious and unconscious motivation in buying decisions.

GEORGE H. SMITH. Social-psychological concepts in motivation research.

A. R. ROOT. Psychology of perception in advertising.

WILLIAM STEPHENSON. Q technique applied to advertising.

Discussant: MELVIN S. HATTWICK.

Division 19. Business Meeting and Presidential Address

1:30-3:30. Monterey Room, Sir Francis Drake

PHILIP H. DUBOIS, *Military Psychology as Seen From a Campus.***Films. Experimental and Applied**

2:00-5:00. Colonial Room, St. Francis

(See listings, Friday afternoon, September 2.)

Division 3. Physiological Psychology I

2:40-3:40. Room A, Sheraton Palace

ROBERT A. PATTON, Chairman

2:40. Fear conditionability of adrenalectomized and hypophysectomized rats. MORTIMER H. APPLEGATE AND GEORGE MOELLER, *Connecticut College.*

PROBLEM: To investigate the role of the pituitary-adrenal system in the acquisition of conditioned fear responses.

SUBJECTS: In six experiments a total of 110 Sprague-Dawley strain, 60-90 day old albino rats were used.

PROCEDURE: Three studies are reported comparing the performances of hypophysectomized and bilaterally-adrenalectomized rats in the acquisition of avoidance running responses to a buzzer paired with shock in the Miller-Mowrer shuttle box. Hypophysectomized rats were compared with sham-hypophysectomized controls in two of these studies, while adrenalectomized and sham-adrenalectomized groups were compared in the third. In all three studies, the CS was an annunciator-type buzzer, a 2.65 second CS-UCS interval was used, and the UCS was a .9 ma shock administered through a short-free floor grid.

Three other studies are reported comparing the performances of hypophysectomized, hypophysectomized-adrenalectomized, and adrenalectomized rats with matched sham-operated groups in a Brown-Kalish-Farber startle apparatus. In these studies a startle stimulus (loud sound) was interpolated randomly in place of the noxious stimulus into a series of paired neutral (flashing light) and noxious (shock) stimuli. Changes in the size of the startle response were used as an index of fear conditioning. The startle stimulus was never paired with shock.

RESULTS: (a) Hypophysectomy appears to interfere with the acquisition of conditioned avoidance responses, whereas adrenalectomy has no apparent effect upon the course of the acquisition curves. (b) Hypophysectomized rats showed no significant in-

crease in the size of the startle response, whereas both adrenalectomized and sham-operated control groups did show significant increases.

CONCLUSIONS: The hypothesis that an intact pituitary-adrenal system is necessary to fear conditioning is not substantiated in these studies, although removal of the pituitary does significantly interfere with fear conditioning. Alternate hypotheses are discussed.

Slides.

2:55. The effect of whole body X-radiation upon the psychological abilities of white rats. PAUL E. FIELDS, *School of Fisheries, University of Washington.*

PROBLEM: To determine the nature and extent of changes in psychological ability in the white rat following exposure to various amounts of whole body X-radiation.

POPULATION: Some 500 male white rats varying in age from 30 days to over two years.

RADIATION DOSES: Totals ranging from 100 to 1,000 roentgens.

APPARATUS: A battery of 40 activity drums (74 $\frac{1}{2}$ in. in circumference); two 69-ft. long elevated straightaways; two 69-ft. 32 and 40 choice-point elevated T mazes (each occupying 700 square feet of floor space); one 5-choice, 5-stage serial multiple visual discrimination apparatus; one 10-choice, 5-stage vertical maze; four copies of the 5-choice multiple visual discrimination apparatus.

PROCEDURE: All subjects were first trained on simple learning problems. After progressing to more difficult problems, they were administered various single or repeated doses of X-radiation and tested immediately and up to 18 months. New complex problems and reversal training on old ones were also learned postradiation.

RESULTS: Speed and amount of activity on all instruments were decreased after radiation, especially during the period of acute radiation sickness. Accuracy on overlearned T mazes was depressed 24 hours after feeding $\frac{1}{4}$ grain phenobarbital, but not after lethal radiation revealed no significant maze or straightaway speed decrements, but a few maze accuracy decrements. On the vertical maze, some speed and accuracy decrements were shown from three to eight months postradiation.

No loss in simple acuity or brightness discrimination accuracy was observed over a 12-months post-radiation interval. Some complex discriminations were affected immediately, but recovered. Age differences between controls (125-545 days) were larger than radiation differences between controls and experi-

mentals of the same age even though significantly more old animals succumbed to 500 roentgens.
Slides.

3:10. The effect of temperature on taste sensitivity in the white rat. PRESTON S. ABBOTT, *Aircraft Observer Research Laboratory, AFPTRC, Mather Field, California.*

PROBLEM: To determine the effect of temperature on sensitivity to taste stimuli as indicated by action potentials in the chorda tympani nerve of the rat.

PROCEDURE: The chorda tympani and lingual nerves were exposed for recording in an anesthetized preparation. The neural activity was amplified, integrated, and then recorded on an Esterline-Angus Inkwriter. Stimulus solutions (NaCl, NaBr, KCl and HCl) at 17°, 22°, 37°, and 45°C were presented through a plastic flow chamber in which the tongue was enclosed. The temperature of this chamber was monitored with a thermocouple. Water at each of the temperatures was passed through the stimulus chamber and over the tongue for one minute before each application of the taste solution. Measurement with the thermocouple embedded in the tissue showed that the tongue's temperature had stabilized after this interval. The neural response magnitude to taste stimulation was recorded when the adapting water (and taste solutions) of the above temperatures were employed.

RESULTS: 1. Changes in temperature of water flowing over the tongue influenced neural activity in the chorda tympani nerve. Activity was minimal at 45°, maximal at 15°C. The same relation existed in the lingual nerve.

2. Response to NaCl was maximal at 22°C. Below this temperature there was a marked decrease in response magnitude. Above 22°C the response fell off but to a lesser degree. A similar curvilinear relation existed for NaBr and KCl except that maximal response occurred at 37°C.

3. There was no appreciable change in response with HCl as a function of temperature.

CONCLUSIONS: 1. Nerve fibers from endings sensitive to temperatures below body temperature appear to be present in both the chorda tympani and lingual nerves.

2. The relation between temperature and effectiveness of taste stimuli does not follow the direct relation typically found between temperature and rates of chemical reactions, namely, a rise with rise in temperature. With HCl, the response is independent of temperature.

Slides.

3:25. Conditioned somatic reflexes acquired during combined experimental catatonia and interruption of ventral roots. EDWARD C. BECK, *Fort Douglas VA Hospital, Salt Lake City, and Robert W. Doty, University of Utah, College of Medicine.*

Classical conditioning using tone as the CS and shock to a limb as the UCS was standard procedure for 15 adult cats divided into a control group and four experimental groups. Experimental animals were treated as follows: Group I, animals were injected with 30 to 50 mg./kg. of bulbocapnine prior to training sessions producing catatonic states in which no overt movement could be detected. Lesions in posterior hypothalamus produced an immobilized state in animals of Group II. This immobility was further fortified with injections of bulbocapnine. Group III, ventral roots L4 to S4 were crushed. The de-efferented hind leg conditioned while nonspecific movement was abolished with bulbocapnine. Animals in group IV were followed under bulbocapnine through all training trials with EEG, EKG, record of limb movement, and respiratory recordings.

RESULTS: Control-group trials to criterion (8/10) ranged from 338 to 870. Animals in each experimental group tested in the undrugged and recovered state (10th week postsurgical for Group III) gave full discrete flexions of the appropriate limb to the CS alone. Levels of conditioning ranged from 4/10 to 25/25 discrete responses in the first presentations of the tone alone. In only one animal no CR's could be elicited (Group III). There were cats in each experimental group whose training trials were within the control-group range. In Group IV, EEG arousal from a "drowsing" pattern to the tone was lost early in the training, but subsequently reappeared. Respiratory changes were transient and sporadic. Cardiac rate did not change. The conditioning process is not seriously disturbed by the elimination of movement nor drastically altered motor behavior. Neither is the somnolent attitude of the catatonic animal a true measure of its perceptual awareness.

Slides.

Division 3. Animal Learning II

2:40-3:40. California Room, Sheraton Palace

J. A. GINGERELLI, Chairman

2:40. Interpolated activity and the spontaneous recovery of an instrumental response. ALBERT E. HICKEY, JR., *Boston University.*

2:55. Latent extinction of a jumping response. NISSIM LEVY, *Brown University.*

PROBLEM: Can a reinforced jumping response be weakened without being made?

APPARATUS: An elevated path 3 ft. long and 3 in. wide leading via an air gap to a white goal box.

SUBJECTS: 60 albino rats 100 to 150 days old.

PROCEDURE: Following one week of taming during which a 22-hour hunger cycle was established, all animals were given the following training: Day 1, two trials with path flush with open goal-box door. On Days 2 through 4 the number of daily trials was gradually increased to 10 the air gap between elevated path and goal-box door was gradually increased to seven inches and the goal-box door (hinged at the bottom) was gradually raised to an upright position. By the end of the fourth day's trials all animals were jumping across a seven-inch gap through the upright goal-box door. The following two days (5 and 6) the subjects were given 10 trials daily bringing the total number of trials to 40. Training trials were reinforced by allowing 15-sec. feeding in the goal box. Measures recorded were: (a) time to traverse the elevated path to jumping end; (b) time until animal jumped through goal-box door. Animals were then randomly assigned to experimental or control groups. On Day 7 experimental animals were placed directly into the now empty white goal box for five 2-min. periods with a 2-min. intertrial interval. Two minutes after the last goal-box experience they were placed at the beginning of the elevated path for the test trial. Control animals were handled in exactly the same way except that they were placed in an unpainted pine box, of the same dimensions as the goal box, on the opposite side of the room.

RESULTS: Comparison of the two groups' jumping response time on the last day of training shows no significant difference in median response time. However, the jumping-response times on the test trial showed that while the over-all median for all 60 animals was 13 sec., 22 of the 30 experimental animals had times slower than 13 sec., while only nine of the 30 control animals had times slower than 13 sec. These data yield a chi square of 11.28 which for 1 df is significant at beyond the 1% level of confidence. Support for the latent extinction hypothesis is provided by these data.

Slides.

3:10. Sucrose as a reward for hungry and satiated rats. MONCRIEFF SMITH AND MICHAEL DUFFY, *University of Washington*.

Recent experiments on the nature of reinforcement suggest that need reduction is a sufficient, but not a necessary condition. This study purports to show that

need reduction can combine additively with other aspects of incentives to facilitate learning.

The subjects were 52 male rats, split into four groups, two hungry and two satiated. All rats were run in a T maze with a 20 per cent sucrose solution in one goal box, and an equal amount of water in the other. One hungry and one satiated group found 4 cc. of sucrose solution or of water, while the other groups found just a drop (about 0.1 cc.). Each rat was given one free trial a day and then one forced trial to the opposite side and retained in each end box ten minutes.

The measures considered were per cent free turns to sugar, and the difference between log time on run to sugar and run to water. For the time curves, no distinction between free and forced runs was made. Both measures showed rapid learning for both 4-cc. groups, with the hungry group learning significantly faster. The drop groups learned very slowly, and had not reached 100 per cent correct choices at the end of 40 days (80 trials). Both showed significant signs of learning, however, and to about the same extent. The hungry group made somewhat more correct choices, but the satiated group reached sooner a significant difference between time on runs to water and sugar.

Since the drop groups received such a small quantity of sugar, any learning by them could be attributed to action on taste receptors. In the 4-cc. groups, both taste and need reduction could contribute to reinforcement, and the results suggest that both do.

Slides.

3:25. Resistance to extinction as a function of variety-of-need satisfaction during training. DAVID ELKIND, *University of California at Los Angeles*. (Sponsor, John P. Seward)

PROBLEM: This paper presents the origin and test of the hypothesis that, other things equal, a response learned under a variety-of-need satisfaction—qualitatively different drives and rewards—will be more resistant to experimental extinction under a variety of drives than will a response learned under uniform-need satisfaction—a single drive and reward.

SUBJECTS AND PROCEDURE: 56 male albino rats were divided into four groups and received one of four treatments. All animals were given two days of training and two days of extinction in a straight 10-ft. runway. They all ran after 22 hours of food or water deprivation and were given 10 massed trials a day in both training and extinction. The four treatments were: (a) hungry-to-food on the first and second days of training, (b) hungry-to-food on the first day of training and thirsty-to-water on the second, (c)

the same as (b) with the order reversed, (d) the same as (a) but thirsty-to-water. All animals were run under thirst on one extinction day and under hunger on the other. For half the animals under each treatment the order of drives in extinction was reversed.

RESULTS: Extinction scores were tested by analysis of variance. None of the interactions were significant. Of the three main effects—treatments, order, and drive—only the F for treatments was found to be significant—beyond the .01 level. A comparison of the means of the treatments showed the variety-of-need-satisfaction groups to have performed significantly better than the uniform-need-satisfaction groups ($p < .01$).

CONCLUSION: The results were discussed in terms of Hull's theory and were found to be consistent with it inasmuch as the results are predictable from the concepts of discriminative drive stimuli, anticipatory goal responses, and the law for the growth of habit strength.

Division 5 and Psychometric Society. Factor Analysis Techniques I

2:40-3:40. Comstock Room, Sheraton Palace

PAUL HORST, Chairman

2:40. The analysis of behavior matrices. JOHN M. BUTLER, *The University of Chicago*.

Given behavior in a situation with n trials requiring one response out of $q \geq 2$ alternatives with the responses made receiving unit scores and the responses not made receiving zero scores, an $nq \times N$ behavior matrix, S , of rank $n(q-1)+1$ results where N is the number of subjects. It can be shown that the sums of the rows of S normalized to N constitute factor loadings on that unit vector making a maximum contribution to the joint proportions matrix, $(1/N) SS'$ with N_j/N as diagonal entries. The residual matrix obtained contains as positive entries the numerator of phi coefficients and like expressions with negative signs expressing a joint tendency to avoid certain alternatives.

The first residual matrix will have maximum entries of $P_j (1 - P_j)$ where P_j is the proportion of subjects endorsing a given alternative. Once communalities have been estimated the residual matrix may be factored by any method. The final solution is restricted by the fact that all factor loadings of a given alternative must have the same sign. When $q = 2$ and orthogonal simple structure is obtained, the solution is identical with that of latent structure analysis.

An advantage of this approach to data matrices is that the actual behavior of the subject is coded. There are no "positive" responses. Also a minimum of statistical assumptions is required. In particular no metric considerations apply. It is believed, therefore, that this approach to factoring is particularly applicable to the construction of personality inventories.

3:00. A constructive definition of simple structure in factor analysis. NORMAN A. CROWDER, *Arment Systems Personnel Research Laboratory, AFPTRC*.

The author proposes an explicit definition of the simple structure solution to the rotation problems in factor analysis. First, a "complete" square matrix is defined as one which has no row or column consisting wholly of zeros. Such a "complete" square matrix may be of any rank consistent with its order. The definition then states that a factor solution (with r columns) exhibits a simple structure if and only if no "complete" square matrix formed by taking any combination of r rows of the factor matrix (or less than r rows, where there exist corresponding r -rowed square matrices which are incomplete) has a rank less than its order. This is equivalent to requiring that there be no linear dependence between rows of the factor matrix, when only the non-zero entries are considered. An example of a completely analytic computing technique for finding the simplest structure for a given configuration is given.

The author argues that the simple structure solution to a given configuration may be thus shown to be unique and completely defined by the proposed method (the data permitting), since any possible further simplification of the solution may always be discovered by evaluating the determinants of the complete square matrices formed from the factor matrix. The discussion considers only the ideal case where no sampling fluctuations occur in the data, and there are no inconsistencies arising from the presence of secondary hyperplanes, either partially or completely determined. The same principles are said to apply to more complex cases, however.

Slides.

3:20. The matching of two sets of factors. CHARLES WRIGLEY, *University of California*, and JACK E. NEUHAUS, *University of Illinois*.

Psychologists are often interested in the relations between two sets of factors. The same tests may have been administered to two different samples of persons or to the same persons on two separate occasions. In another situation, two different batteries of tests designed to measure the same traits may have

been given to a common sample of persons. In each case two sets of factors are obtained, and the problem is to determine how far the factors in one set agree with those in the other.

The first section of this paper considers the matching of factors derived from analyses of the same tests given to two different samples of persons. Reasons are given for preferring indices of proportionality of loadings to coefficients of correlation as measures of factorial similarity. The special relations in comparing principal axes solutions are considered, and the matrix of indices of similarity is shown to be orthonormal if all factors are extracted. A solution is then presented to the problem of finding orthogonal transformations of the two sets of factor loadings which insure mutual orthogonality of the rotated factors, i.e., that factor j of set A is orthogonal to all factors but factor j of set B. If F , G are the two sets of loadings, T_1 , T_2 the two transformation matrices, T_1 is shown to equal the latent vectors of $F'GG'F$, and T_2 the latent vectors of $G'FF'G$.

The second section considers the case when persons are the same but there are two samples of tests. The proposal is made that indices of similarity be based upon the degree of proportionality of the factor measurements, and it is proved that, when rotations are made to insure mutual orthogonality of the factor measurements, the indices are equal to the canonical correlations between the two sets of tests.

Division 5. Symposium: The Measurement of Communication Structure in Task-Oriented Groups

2:40-4:40. Concert Room, Sheraton Palace

MURRAY GLANZER, Chairman

Participants:

R. DUNCAN LUCE. The measurement of communication structure in task-oriented groups.

MURRAY GLANZER. Measures and effects of group structure.

THORNTON B. ROBY. The measurement of communication structure in task-oriented groups.

Division 1. Business Meeting and Presidential Address

3:50-5:50. Italian Room, St. Francis

WAYNE DENNIS. *The Minor Researches of Eminent Psychologists.*

Division 2. Forum: Psychology in Foreign Countries—Curriculum and Teaching Methods

3:50-5:50. Borgia Room, St. Francis

DONALD BRIELAND, Chairman

Division 3. Presidential Address and Business Meeting

3:50-5:50. California Room, Sheraton Palace

JAMES J. GIBSON. *Stimulation and Perception.*

Division 7. Presidential Address, Business Meeting, and Social Hour

3:50-7:00. Green Room, St. Francis

BOYD R. McCANDLESS. *Motivational and Social Structure Research at Pre- and Elementary-School Age Levels.*

Division 14. Business Meeting, Presidential Address, and Social Hour

3:50-7:00. Empire Room, Sir Francis Drake

EDWIN E. GHISELLI. *The Placement of Workers: Concepts and Problems.*

Ohio State Faculty and Alumni. Informal Meeting

4:30-6:30. Room 210, Sir Francis Drake

Harvard Graduate School of Education Alumni. Informal Social Hour

5:00-7:00. Room 2042, Sheraton Palace

Division 5. Business Meeting

5:00-6:00. Room A, Sheraton Palace

University of Chicago Alumni. Social Hour

6:00-7:00. Monterey Room, Sir Francis Drake

Sir Charles Bell Society. Dinner Meeting

6:30. Far East Restaurant, 631 Grant Street

MONDAY EVENING, SEPTEMBER 5

Division 5 and Psychometric Society. Dinner and Presidential Addresses

7:00. Concert Room, Sheraton Palace

Lee J. Cronbach (Div. 5). *Assessment, 1955*
Ledyard R. Tucker (Psychometric Society).
Psychometric Theory: General and Specific

Division 2. Presidential Address and Business Meeting

8:00. Borgia Room, St. Francis

RICHARD W. HUSBAND. *College Achievement as Predictive of Success Thirty Years Later.*

International Council of Women Psychologists.
Panel of Invited Speakers.

The Psychologist's Responsibilities in an Anxious World, as viewed by RALPH W. TYLER, Director of the Center for Advanced Study in the Behavioral Sciences; LOREN MILLER, Chairman of the West Coast Legal Committee of the National Association for the Advancement of Colored People; other speakers to be announced.

D. B. KLEIN, Moderator

8:00 P.M. Ballroom, Sheraton Palace

Psychometric Society. Meeting, Council of Directors

9:00. Room 2042, Sheraton Palace

Division 3. Reception

9:00. Comstock Room, Sheraton Palace

TUESDAY MORNING, SEPTEMBER 6

Division 2. Classroom Learning

8:40-9:40. Borgia Room, St. Francis

DOROTHY R. MARTIN, Chairman

8:40. Effect of direct observation of children in producing learning and changing attitudes among students of educational psychology. FREDERICK B. DAVIS, *Hunter College*.

PROBLEM: To compare the amounts of learning and the changes in certain attitudes among undergraduate students of educational psychology produced by (a) an observation of administration of the Stanford-Binet Scale both preceded and followed by an appropriate one-hour discussion; (b) an observation of administration of the Stanford-Binet Scale plus regular textbook assignments on the measurement of intelligence; (c) an observation of administration of the Stanford-Binet Scale; (d) classroom work and assignments on topics other than the measurement of intelligence.

PROCEDURE: Four sections of the same course in Educational Psychology were taught by each of two staff members at Hunter College. Consequently, one section taught by each staff member was handled in each one of the four ways outlined above. Two short achievement tests and one sentence-completion test were administered in each of the eight classes at the end of the experimental period. It was shown that the eight classes were insignificantly different with respect to mean scholastic aptitude.

RESULTS: The amount of learning decreases consistently from procedure (a) through procedure (b).

Changes in attitude tend to follow the same pattern. **CONCLUSIONS:** Observation of an intelligence test is maximally useful in a course in educational psychology if it is coordinated with appropriate discussions following and preceding it. The extent and nature of the advantages gained will be discussed.

9:00. Learning in a freshman psychiatry course as measured by projective techniques. WALTER G. KLOPFER, *Norfolk State Hospital and University of Nebraska College of Medicine*.

PROBLEM: The major purpose of the course in freshman psychiatry in this case was to make the students sensitive to the role of unconscious factors in the motivation of behavior. It was felt that this sensitivity could not be judged adequately by the usual type of objective examination, but that some new techniques had to be developed.

SUBJECTS: 85 medical students in their freshman year at the University of Nebraska College of Medicine.

PROCEDURE: At the beginning of the course, each student was given a sheet containing abstracts from a projective battery (Benjamin's Proverbs, Sentence Completion, Blacky, MAPS) that had been administered to a 14-year-old boy. They were instructed to write down whatever they could gauge about the personality traits and characteristics of the subject from the material presented. The results were rated on a scale with previously established rater reliability. The entire procedure was repeated at the end of the course.

RESULTS: As a whole, the class tended to show improvement in their ability to perceive the influence of unconscious factors as measured by the experimental procedure. No consistent relationship between degree of improvement (initial vs. final rating) and final grade in the course could be demonstrated. However, there was a significant relationship between the student's initial rating on the projective material and his grade in the course.

CONCLUSIONS: The procedure outlined above seems to be a useful one for predicting achievement in a course the purpose of which is to sensitize the student to the influence of unconscious material. It also seems useful as a potential device for measuring the efficacy of teaching in a course which has this purpose.

9:20. Effects of feeling-oriented classroom teaching upon reactions to feedback. ALAN H. ROBERTS, JOHN H. SCHOPLER, EWART E. SMITH AND JACK R. GIBB. *University of Colorado*.

PROBLEM: The hypotheses tested were (a) Groups given intensive feeling-oriented classroom training will show less defensive feeling, greater task efficiency, and greater feelings of task progress than will untrained groups. (b) Feeling-oriented feedback

will augment these differences more than will task-oriented feedback.

SUBJECTS: 200 college students divided into 40 five-member groups.

PROCEDURE: Twelve six-member groups were given 16 weeks of intensive feeling-oriented training in an applied group dynamics class. These 12 trained groups, together with 28 untrained six-member groups, were placed into a design in which some conditions received task-oriented and some conditions received feeling-oriented feedback. Each group engaged in three 8-min. work periods on the Colorado Story Reconstruction Task. These periods were interspersed with 5-min. periods in which data were collected and fed back to groups in graph form. Data on feelings were used in the feeling groups and on task efficiency in the task groups. Appropriate dependent variable measures were made during and after the experimental periods.

RESULTS AND CONCLUSIONS: The trained group showed significantly less defensive feeling (as measured by the Colorado D-F scale), showed significantly less efficiency in story reconstruction, and made significantly higher scores on a perceived progress scale. These data are interpreted as indicating less defensive behavior in the trained groups as compared with untrained groups.

The second set of hypotheses regarding the augmentation effects of feeling orientation were not corroborated. There is some evidence that task orientation augments task-efficiency differences more than does feeling orientation.

These results, together with subsidiary findings, are discussed in relation to a theory of classroom training.

This research is part of a project sponsored by the Group Psychology Branch of the Office of Naval Research.

Slides.

Division 3. Human Learning I

8:40-9:40. English Room, Sheraton Palace

GREGORY A. KIMBLE, Chairman

8:40. Magnitude of response to compounds of discriminated stimuli. WILLIAM W. GRINGS, *University of Southern California*.

PROBLEM: To test the hypothesis that, with simple visual stimuli in an arrangement designed to minimize interaction of components in the visual field, the magnitude of response (GSR) to compounds of stimuli will be directly related to the sum of the response strengths of the component stimuli.

SUBJECTS: 32 college students.

PROCEDURE: Three levels of galvanic skin response to

small circles of colored light were established through classical conditioning procedures. The unconditioned stimulus was an electric shock. Training was to individual stimuli, and subsequent responses were measured to single stimuli and pairs. The three response levels were obtained through (a) consistent reinforcement, (b) nonpresentation during training series, and (c) consistent nonreinforcement. The hypothesis predicted the following order of magnitude of GSR's upon posttraining tests: maximal where reinforced stimulus components are tested as a compound; intermediate when "not response trained" stimuli are paired with other classes; least when nonreinforced components are presented with either of the other classes of stimulus.

RESULTS: When tested alone the mean conductance change produced by the consistently reinforced stimuli was 2.3 micromhos; by the nonpresented stimuli 1.6 micromhos; and by the consistently nonreinforced 1.4 micromhos. Statistical significance of these differences support the conclusion that differential conditioning was obtained. The response magnitudes in micromhos to compounds (pairs of stimuli) are as follows: two consistently reinforced stimuli 2.4, reinforced with nontrained stimuli 1.5, reinforced with nonreinforced stimuli 1.1, and nonreinforced with nontrained stimuli 1.3. Control variables such as intrinsic color differences and instruction effects are evaluated.

CONCLUSIONS: The results support the statement that for this class of stimulus the response magnitudes to simple combinations are determined by interaction of the response strengths of the components. The implications of this function are discussed and further results varying preconditioning stimulus familiarity are presented.

Slides.

8:55. Transfer from verbal pretraining to motor performance as a function of motor task complexity. WILLIAM F. BATTIG, *University of Wisconsin*.

PROBLEM: Results of studies of the effect of verbal pretraining upon subsequent motor performance have been inconsistent. Positive transfer is usually found when the motor skill involves a simple discrimination, but not with complex tasks like lever-positioning and tracking. The present research was designed to determine whether the effect of verbal pretraining on motor performance varies with motor task complexity.

SUBJECTS: 240 undergraduate psychology students assigned to 12 groups of 20 each.

PROCEDURE: A 3×4 factorial design was used, with three pretraining conditions, and four levels of motor

task complexity varied in terms of number of fingers used (1 to 4) on a finger-positioning task. This task required the subject to place each finger in one of five positions, each position corresponding to a green light on a display panel, so as to simultaneously light the green lights adjacent to each of a series of red stimulus lights on the panel, which constituted a match. Performance was measured in terms of the number of matches per 1-min. trial for 20 trials. Pretraining conditions were (a) relevant S: subjects pronounced nonsense words formed from letters corresponding to the motor task stimulus lights; (b) relevant S-R: verbal descriptions of finger positions for a correct match were given; (c) control: no pretraining was given.

RESULTS: Relevant S-R pretraining was significantly superior to control groups for both one- and two-finger complexities. Relevant subject pretraining was significantly superior only for one-finger. No significant pretraining effect was obtained for three- and four-finger complexities.

CONCLUSIONS: Under the present method of varying motor task complexity, amount of positive transfer from verbal pretraining decreases with an increase in task complexity.

Slides.

9:10. Motor performance and reminiscence as a function of intertrial rest and sex. E. JAMES ARCHER AND LYLE E. BOURNE, JR., University of Wisconsin.

The study was concerned with a detailed analysis of inverted alphabet printing as a function of intertrial rest interval and sex of the subject. The experiment was designed to test Kimble's hypothesis that subjects serving under massed practice will "bootleg" a rest when reactive inhibition attains a certain threshold value. It seemed logical that men and women would differ in the level of reactive inhibition they would tolerate before resting.

A total of 84 volunteer college students (half of whom were men) were randomly assigned to one of three conditions of distribution of practice (0, 30, and 60 sec.). All subjects had 20 30-sec. trials followed by 5 min. of rest and then six more trials with 30-sec. intertrial rests. The subjects printed the alphabet on a roughened aluminum sheet. A fine wire connected to the top of a soft lead pencil completed a circuit when the subject touched the pencil to the writing sheet. These electrical signals were analyzed for duration of time spent actually printing and time spent traveling between letters. In addition, an electronic analyzer provided a frequency distribution of durations of time subjects spent continuously printing or traveling.

The results indicate that: (a) distribution of practice facilitates performance in terms of number of letters printed; (b) women are significantly better than men ($F = 5.296$, for 1 and 78 df , $p < .05$); (c) the mean interletter travel time duration, which decreased as a function of practice, was inversely related to the length of the intertrial interval ($F = 6.112$, for 2 and 78 df , $p < .01$); (d) the superiority of women can also be identified with significantly shorter travel times ($F = 19.342$, for 1 and 78 df , $p < .001$); (e) there was no evidence that "bootleg" rests appeared in later stages of training for massed-practice subjects.

The results do not support Kimble's hypothesis. However, the results suggest that reactive inhibition primarily operates to delay a subject from responding (increases the travel time) and that the dissipation of reactive inhibition over a rest with subsequent reminiscence is reflected in decreased travel time. It is not clear whether this delay in responding is interference with the effector system or deliberate pacing by the subject.

Slides.

9:25. Acquisition and retention of skill during extended practice on a complex perceptual-motor task. DON LEWIS AND WILLIAM F. LOWE, State University of Iowa.

PROBLEM: To study the acquisition and retention of skill in performing a perceptual-motor task requiring a relatively large amount of manipulative proficiency.

APPARATUS: SAM Complex Coordinator, Model D.

SUBJECTS: 46 undergraduate male students.

PROCEDURE: During each practice session, half of the subjects practiced for 20 minutes without rest while the other half had 10 trials, each two minutes in length, with intertrial rest pauses of 30 seconds. Records of performance were made every two minutes for the massed group. A practice session was held once each week for 10 weeks. Then there was a three-week period without practice. Next came four additional sessions, one each week for four weeks. After a period of approximately four months, a final practice session was held.

RESULTS: The performance of subjects practicing under distributed conditions was superior to that of subjects practicing under massed conditions. Through the first four practice sessions, there was little loss in proficiency over the weekly periods without practice. Beginning with Session 5, the level of performance on the first trial (first two minutes) of every session was lower than the level on one or more trials in the previous week's session, the decreases in level became increasingly large as practice continued, and there was either a levelling off or a dropping off in

proficiency during each session. The decrements in performance over the three-week holiday break was about the same in magnitude as those occurring over one-week intervals toward the end of practice. This fact suggests that the decrements represented not "true forgetting" but loss of set or warm-up. The larger losses over periods without practice were associated with the higher levels of proficiency. Conditions of practice seemed to bear no relationship to retention.

Slides.

Division 5 and Psychometric Society. Factor Analysis Classification Studies

8:40-9:40. Comstock Room, Sheraton Palace

LEDYARD R. TUCKER, Chairman

8:40. Approximate circumplex structures of MMPI scores. LOUIS GUTTMAN, *The Israel Institute of Applied Social Research*.

A reanalysis is made of Tyler's intercorrelations of fifteen MMPI scores for 400 male veterans, to test the hypothesis that these variables form part of a radex. An approximate circumplex is found among the following six scores: psychopathic deviate, schizophrenia, prejudice, social introversion, depression, and hypochondriasis. Another approximate circumplex is found among the following seven scores: masculinity-femininity, status, dominance, paranoia, hysteria, responsibility, and hypomania. (The above two listings are according to the respective circular orders.) Some deviations of the data from the general circumplex patterns are noted.

Since related personality data have been observed elsewhere to yield polytone and multivalued regression systems, the linear regressions presumed to exist among these MMPI scores may be artifacts of a relatively arbitrary scoring system. This raises further questions as to why approximate circumplexes have appeared.

9:00. Factor analysis applied to the classification of psychosomatic types. ALBERT F. AX, E. F. GOCKA, J. P. HINDLEY, W. S. KOGAN, C. E. LUNNEBORG, R. D. QUINN, H. S. RIPLEY, R. W. WENDAHL, W. C. WILLIAMS, AND C. E. WRIGHT, *University of Washington and The Veterans Administration*.

Forty-four subjects (psychiatric patients and well-adjusted controls) were observed with a 10-channel polygraph during administration of pain and interview stresses on two different occasions. Personality descriptions were made both by the subjects and by the psychiatrists via a 96 item Q sort covering 25 variables. Additional personality information con-

sisted of the IQ, age, and the 16 variables of the Edwards Personal Preference Schedule. The 140 physiological and 79 psychological scores were normalized and a 44 by 44 product matrix prepared by summing the 219 cross products for each pair of subjects. This transposed product matrix was then factored by the principal-axes method on the IBM 701 digital computer.

The significant factors of this factor score matrix were employed to obtain the factor loading matrix which was rotated to simple structure. After rotation factors were described in terms of their test loadings and then transposed back to the factor score matrix which provided a convenient profile for each subject. These profiles were classified into subgroups which constitute psychophysiological types. Each subtype was then examined for physiological and psychological differences and related to criterion group membership. The method of factoring the smaller dimension of the transposed raw score matrix with subsequent conversion permits considerable economy when the number of variables exceeds the number of subjects.

The factor loadings, factor scores, and the classification of the final profiles will be presented with a discussion of the psychosomatic factors which appear to be responsible for the classifications.

9:20. The structure of the airman technical school domain in relation to job families. JOHN A. CREAGER, *Personnel Research Laboratory, AFPTRC, Lackland Air Force Base*.

PROBLEM: Methodology for dealing with the problem of defining job families in a program of differential classification and assignment is illustrated using Air Force data. The problem is to describe the job domain defined by selected airman technical school training criteria, and to analyze the criterion domain structure into a set of dimensions. The technical schools are then assigned to families on the basis of their locations in the school space.

SUBJECTS: Basic data for the study include validity coefficients of the Airman Classification Battery tests for 46 technical school training criteria. The validities are based on approximately 500 airmen trainees per school. The intercorrelations among twenty classification tests were based on 755 basic airmen.

PROCEDURE: The correlations among the 46 airmen technical school training criteria were estimated by regression methods expressed in matrix form. The methodology is described. The estimated criterion intercorrelation matrix was factored by the centroid method and rotated to approximate simple structure. The 46 schools were assigned to clusters on the basis of their location in the school space as revealed by the rotated factor matrix.

RESULTS AND CONCLUSIONS: Four dimensions of the criterion domain were identified as General Mechanical, Clerico-academic, Services, and Crafts. Two specifics were also obtained and are briefly discussed. The formation of clusters is discussed in relation to the question of the optimum number of job families. Further research indications are discussed with special reference to describing the classification tests in terms of job-defined dimensions, and obtaining regression weights for prediction composites.

Division 5. Symposium: Content Validity of Nonfactual Tests

8:40-10:40. Room A, Sheraton Palace

ROBERT L. EBEL, Chairman

Participants:

ROGER T. LENNON. Assumptions underlying the use of content validity.

EDITH M. HUDDLESTON. Test development on the basis of content validity.

ROBERT L. EBEL. Obtaining and reporting evidence on content validity.

Division 7. Developmental Trends

8:40-9:40. Room 210, St. Francis

MAX M. LEVIN, Chairman and Discussant

8:40. Mediation of moral values in early adolescence. CARSON McGUIRE, IRMABEL PHILLIPS, AND ROBERT F. PECK, *University of Texas*. (Sponsors, Carson McGuire and Robert F. Peck)

PROBLEM: To identify sources of variation in the mediation of values attached to honesty, loyalty, moral courage, responsibility, and friendliness by early adolescent girls and boys with reference to family, peer, school, and self contexts. To test a rationale for Q methodology wherein mediations of stimulus items from "least like" to "most like" by subsamples of persons are represented by quasi-normal distributions of Q values assigned to sorts of structured Q samples into a system of nine tied ranks.

SUBJECTS: 150 ninth-grade pupils in a junior high school, equally divided by sex, in subsamples of 25 from upper-middle, lower-middle, and upper-lower family backgrounds.

PROCEDURES: Q samples of 100 statements structured for areas and contexts of moral values were sorted to represent "the person I am" (self), "the person I ought to be" (ideal), and "most other persons my age" (other). In addition, each subject selected one of four responses referring to contexts for each of five story situations embodying the moral values (SSR).

RESULTS: A test of homogeneity within area and

context categories for persons by sex role and life style (ACSLP) in each sort demonstrated the reliability of Q values. In Q self and Q ideal, boys described themselves in terms of moral courage more frequently than girls (AS). In addition, ideal-descriptions varied in terms of life style (AL, CL) indicating a residual of family influences. Other-descriptions showed a common frame of reference for representing age mates (AC) regardless of sex or family influences. Although variability in SSR was like Q ideal, the added CS interaction demonstrated Coombs' distinction between irrelative (SSR) and relative (Q) behavior.

CONCLUSIONS: Carefully constructed and interpreted Q samples can yield valuable data on mediation processes and residual factors operating in different frames of reference and should lead to further developmental studies of girls and boys in age-graded sample populations.

Slides.

8:55. Predictive value of subjective choice of occupation and of the Strong Vocational Interest Blank over fifteen years. JOHN B. ENRIGHT AND SAMUEL R. PINNEAU, *University of California*. (Sponsor, Samuel R. Pinneau)

This study, part of a larger project following up the subjects of the Adolescent Growth Study, was designed to test two common assumptions about the vocational choices of adolescents: (a) that their occupational choices are inaccurate as predictions of the jobs they actually obtain later, and (b) that they tend to aim at jobs at a higher socioeconomic level than they can actually hope to attain. With regard to the first assumption, McArthur, at Harvard, found subjective choice to be less accurate than predictions from the Strong Vocational Interest Blank (SVIB) in college boys of public-school background. No longitudinal data have been adduced in support of the second hypothesis.

In 1938-39, the SVIB, the best objective interest inventory, was given to the subjects of the Growth Study in their senior year of high school. At the same time, they were asked to state the occupation they planned to enter. Occupational data were available on many of these subjects approximately 15 years later. Of these, 44 had expressed an occupational aim in high school; 26 (59%) of these were engaged in that occupation. Of the 43 whose current jobs were comparable to some occupational scale of the SVIB, 16 (37%) were engaged in an occupation in which they had received an "A" score.

To test the second hypothesis, an occupational level score was determined for each subject's (a) expressed vocational aim, (b) present occupation, and

(c) occupation on which he received his highest SVIB score. The correlation between (a) and (b) was .80, between (b) and (c), .14.

It is evident from the preceding results that the subjective occupational choices of adolescents have high predictive value. Qualifications of the apparent superiority of subjective choice over SVIB results will be discussed.

9:10. Rate of mental maturing as related to level of intelligence. SAMUEL R. PINNEAU, *University of California*.

The present study, one aspect of a comprehensive analysis of the mental development of the subjects of the Berkeley Growth Study (BGS), was designed to determine if different rates of mental maturing are related to level of intelligence.

An earlier peak in variability for this intellectually superior group is found when its age changes in variability are compared with those of the Stanford-Binet standardization sample. This suggests that more intelligent subjects experience a relatively earlier and more rapid rate of mental development. If so, one would expect this phenomenon to be apparent in the means and standard deviations of both groups. Graphs showing the ratios of the standard deviations to the means for both samples are congruent with this hypothesis, i.e., there is an increase in these ratios to ages 10 and 12 for the BGS and the standardization samples, respectively, and subsequently a decrease. This result would be expected if an increased rate of mental growth appeared earlier in some subjects than in others and if there was subsequently a return towards more normal variability as an increasing majority of cases completed their mental growth. Also congruent with this hypothesis is the earlier increase and decrease for the BGS.

In order to obtain further evidence on this point, the subjects of the BGS were grouped into the more and less intelligent as of age six. The subsequent yearly increases in mental age increments to age 17 were determined for each of the two groups. A comparison of these increments indicate a significantly higher rate of mental growth for the more intelligent subjects only during the grade school years. Comparable results are obtained when the groupings are based on 17-year performance.

The relation of these increment changes to socio-economic level and to physical maturing will also be discussed.

Slides.

9:25. Discussion.

Division 14. Attitude Studies

8:40-9:40. Empire Room, Sir Francis Drake

WENDELL F. WOOD, Chairman

8:40. Foreman identification with management, work-group productivity, and employee attitude. M. J. BALMA, *Evendale Operating Department, General Electric, and J. C. MALONEY, Minneapolis-Honeywell Company*. (Sponsor, C. H. Lawshe)

The historical trends of unionism and scientific management have tended to make foremen feel that they are the "forgotten men" and no longer the "key men" of management. Since 1945 many industrial managements have made efforts to help their foremen feel they were an essential part of management.

The purpose of this research, a Purdue Research Foundation project, was to determine what relationships exist between the extent of a foreman's identification with management and two aspects of a foreman's effectiveness as a supervisor: work group productivity, and employee attitude toward immediate supervisor.

A measure of foreman identification with management was logically developed using the Error Choice or Direction of Perception technique of indirect attitude measurement. A double cross-validation method of item analysis, against an internal consistency criterion, was used with a group of 212 first-line foremen from seven manufacturing plants in the midwest. The odd-even reliability estimate for the resulting 30-item measure was: .63.

A group of 45 highest level corporation executives scored significantly higher than the foreman group ($P < .001$), providing substantial evidence for the management identification measure.

The questionnaire was revised and administered to 1,500 first-line foremen in 28 manufacturing plants in the midwest and east.

A productivity measure was obtained from higher management's rankings of foreman work groups in each plant on the basis of judged productivity.

A questionnaire measuring attitude toward immediate superior ($r = .91$) was administered to the employees of the highest and lowest rated productivity groups in each plant.

A double-classification analysis of covariance design was used to analyze the above data.

Results are presented and discussed.

9:00. Attitude patterns of the foreman and the worker. RICHARD J. OBROCHTA, *Loyola University*.

The problem studied was whether or not foremen and workers who have favorable attitudes toward

each other tend to "share" attitudes toward the company, job, union, and union leadership. Conversely, whether or not foremen and workers who have unfavorable attitudes toward each other tend "not to share" attitude toward the company, job, union, and union leadership.

Sixty-five meatpacking plant hourly workers and their department foremen were interviewed for their attitudes. The interviews were recorded and later typed. The typed manuscripts were then read, analyzed, and evaluated. A scale of 1.0 to 5.0 was used to measure the favorability or unfavorability of the workers' or foremen's attitudes: 1.0 being at the "very favorable" end of the scale and 5.0 being "very unfavorable." To obtain the degree of sharing of attitudes by the workers and foremen, the algebraic sums of their attitude ratings were derived. The standard error of the differences between two sample percentages was then obtained for the foremen-worker group with favorable interpersonal attitudes and the foremen-worker group remaining in the sample. Critical ratios were derived to test the significance of the attitude differences of the two foremen-worker groups. A percentage check on the reliability of the attitude ratings was also made.

The results on the reliability check of the hourly-worker ratings showed a range of agreement from 87.8 per cent to 96.9 per cent. The range of agreement for the foreman's ratings showed a range of agreement of 89.4 per cent to 100 per cent. "Agreement" was defined at a difference in rating scores of plus or minus 1.0.

Foremen and workers agreed mostly on their attitudes toward the company, least on their attitudes toward the union leadership. Foremen tended to be more favorable in their attitudes toward the company and also toward the union leadership. Workers tended to be more favorable in their attitudes toward the foremen and the union.

No significant differences were found to indicate that if a foreman and worker like each other, they will tend to share attitudes toward the company, job, union, and union leadership. The foremen-worker group with unfavorable attitudes was not large enough for analysis.

9:20. Higher levels of management and employee attitude toward the foreman. RICHARD D. DRAPER, *Bell Telephone Laboratories, Inc., New York.*

This study was undertaken to investigate the relationship of several variables to employee attitude toward foremen. Particular emphasis was placed upon isolating the influence of a higher level of management upon employee attitude. The research, con-

ducted at Purdue University, was sponsored by the Purdue Research Foundation in conjunction with a large manufacturing organization.

An opinion survey was administered to 1,345 employees at one plant, 1,277 of whom submitted usable replies. Samples of 270 and 174 cases were drawn from the population for two of the analyses.

To test the hypothesis that the attitudes of employees toward foremen are associated with the superintendent to whom the foreman reports, a single classification analysis of variance design was employed, with superintendents designated as treatments and employee attitude toward the foreman as the measured variable. Fifteen items from the opinion survey were selected to measure attitude toward the foreman. The two smaller samples were used to control any differences due to union membership or to type of work performed.

Since the data were such that a more complex analysis of variance would have resulted in empty cells, it was necessary to study relationships with other variables separately. Investigation was made of the differences in the attitudes toward their foremen of pieceworkers and day workers and of employees under varying degrees of pacing pressure related to the nature of the job.

The analyses of variance revealed differences in the attitudes of employees toward foremen in relation to the superintendents' organization in which they were working. There were no differences in the attitudes of pieceworkers as compared with those of day workers. A slight negative relationship was revealed between the degree of work pacing and employees' attitudes toward foremen.

The results of this study clearly suggest, although they do not prove conclusively, that a higher level manager has an influence on his organization which is reflected in employees' attitudes toward their foremen.

Second Session. Council of Representatives, APA

(Roll call by Representatives of divisions and CSPA. Open to all APA members.)

9:00 A.M.-5:00 P.M. California Room, Sheraton Palace

Films. Miscellaneous

9:00-12:00. Colonial Room, St. Francis

(See listings, Saturday morning, September 3.)

Division 2. Coffee Hour

9:50-10:50. Room 221, St. Francis

Division 2. Forum: Psychology in Schools of the Future

9:50-11:50. Auditorium, U. of C. Extension Bldg.

SUMNER L. CRAWLEY, Chairman

Discussants: PHILIP F. ASHTON AND CLARK LEAVITT.

Division 3. Human Learning II

9:50-10:50. English Room, Sheraton Palace

DONALD W. TAYLOR, Chairman

9:50. Effects of multiplicity and regularity on accuracy of immediate recall. CHARLES R. BROWN, HILTON M. BIALEK, AND GEORGE A. AUSTIN, *Claremont Graduate School, Claremont, California*. (Sponsor, George A. Austin)

PROBLEM: Why does a person have difficulty recalling material that is presented only once? The effect of the following variables on accuracy of reproduction and practice effect for nonverbal patterns was tested: number of items, number of homogeneous parts (groups of identical items), regularity-irregularity of parts.

SUBJECTS: 60 male inmates of a minimum-security prison.

PROCEDURE: Subjects, tested individually, were presented for 15 seconds with a linear pattern containing an equal number of crosses and circles, for example, XXXXOOXXOOOO. The example has 12 items and four homogeneous parts. Patterns had 12, 16, or 20 items with 4, 6, 8, 10, or 12 parts. Other aspects of the pattern were randomized. The subject's score was number of correct parts in the attempted reproduction.

Each subject reproduced 14 patterns. Ten subjects received the four 12-item patterns, then the five 16-item patterns, then the five 20-item patterns. The remaining 50 subjects underwent the other five serial order permutations.

RESULTS: All four-part patterns together produce fewer errors than all 10-part patterns (.01 level).

Omitting 12-part patterns, all 12-item patterns together produce fewer errors than all 20-item patterns (.01 level). This effect is due to low difficulty of the 12-item 10-part pattern, which contains an almost regular alternation of crosses and circles. It produces fewer errors than the patterns of 16-item 10-part (.01 level) and 20-item 10-part (.01 level).

Patterns received in the last third of serial order produced fewer errors than patterns received in the first third (.05 level). Practice effect was shown only by two of the 14 patterns, the almost regular 12-item 10-part (.05 level) and 20-item 12-part (.01 level).

CONCLUSIONS: Accuracy of reproduction depends on number and regularity of homogeneous parts, but not on total number of items. Practice effect possibly depends on regularity of parts.

10:05. The effect of number and regularity of alternatives on card-sorting time. JACK A. BLACK, ARNOLD M. COOPER, AND GEORGE A. AUSTIN, *Claremont Graduate School, Claremont, California*. (Sponsor, George A. Austin)

PROBLEM: Two aspects of stimulus complexity are number and regularity of alternatives. Are the effects of these variables independent or interacting? The question was investigated using as response variable mean latency as expressed in card-sorting time.

SUBJECTS: 24 male inmates of a minimum-security prison.

PROCEDURE: The subject was given a deck of 60 cards of normal playing-card size. Each card was marked with a 1 3/4-in. high letter (A, B, C, D, or E). The task was to sort the cards into corresponding marked bins. Score was sorting time in seconds.

Decks contained two alternatives (AB), three (ABC), four (ABCD), or five (ABCDE). The cards were either regularly arranged, e.g., ABCABC, or randomly shuffled. Each subject sorted eight decks.

A two-way factorial design was combined with a latin square, the latter being used to reduce uncontrolled variation of individual differences and practice.

RESULTS: All sources of variation were significant at the .01 level. Significance of subjects and order showed the usefulness of the latin-square aspect of the design. Of the remaining sources of variation, the largest was Regularity ($F = 126.95$), followed by number of Alternatives ($F = 39.00$) and Regularity \times Alternatives ($F = 15.71$).

Mean score for the two-alternative deck (31.4 sec.) did not differ significantly from score for the regular five-alternative deck (34.9 sec.) or from score for the random two-alternative deck (33.2 sec.). Each differed significantly from score for random five-alternative deck (49.4 sec.).

CONCLUSIONS: Number and regularity of alternatives affect sorting time both individually and in interaction. Regularity reduces number of effective alternatives to two. Number of alternatives is therefore a dimension of stimulus complexity on in the absence of regularity.

10:20. Retention as a function of meaningfulness and intralist similarity of serial lists. BENTON J. UNDERWOOD, *Northwestern University*.

PROBLEM: While it is generally believed that recall is directly related to meaningfulness, there has been no satisfactory test of this. The first purpose of the present experiment is to make such a test. Several experiments have shown that, contrary to current theory, intralist similarity does not influence recall. However, these experiments have been done under

conditions where interference from previously learned materials may have confounded the recall measures. Therefore, the second purpose of the present experiment is to test recall as a function of intralist similarity when the subject has not learned other material previously in the experimental situation.

PROCEDURE: Four serial lists of 10 nonsense syllables each were used. Two of these lists were made up of syllables of from 93.3 to 100 per cent association value and two of syllables having from 0 to 20 per cent. One of the high-association lists had high intralist similarity and one had low; the same was true of the low-association lists. In low similarity lists five vowels were used twice and 20 consonants once each. In high similarity lists five vowels were used twice and four consonants five times each. The four lists provide a 2×2 design. A total of 400 subjects was assigned in rotation to the four cells so that 100 subjects appear in each. Each subject learned his specified list to one perfect trial with recall and relearning 24 hr. later.

RESULTS: Rate of learning was directly related to meaningfulness and inversely to intralist similarity. When response strength at end of learning was adjusted for each item for differences in acquisition rates, meaningfulness did not influence recall for any level of response strength. The lists of low intralist similarity were recalled better than those of high similarity (.05 level). Relearning showed the same relationships with the two variables as did original learning.

Slides.

10:35. Facilitating and inhibiting effects of the UCS in eyelid conditioning. GREGORY A. KIMBLE AND ROBERT H. DUFORT, *Duke University*.

Previous research has shown that it is possible to omit the CS in eyelid conditioning after 20 trials and, with applications of the UCS alone, produce an increase in response strength similar to that obtained with trials of paired CS and UCS stimulations. This experiment studied the effect of presenting the UCS stimulations at other points in conditioning.

Six groups of six subjects each participated in the experiment. All groups received 60 acquisition trials and 30 extinction trials. For one control group, all conditioning trials consisted of paired CS (light)-UCS (air puff) stimulations. The other five groups received 20 trials with the air puff alone at different points in conditioning. Preliminary research indicated that the number of previous conditioned responses was more important than the number of conditioning trials. Accordingly, four groups received 20 UCS stimulations after 0, 1, 2, or 3 CR's. A final group received the UCS trials after 20 conditioning trials. A later determination revealed that this was after an average of five CR's.

Results showed that, after 0, one, or two CR's, the

UCS trials interfere with subsequent conditioning. After three CR's or 20 trials the same treatment is facilitating. The interpretation offered is that the UCS stimulations produce a motivational state which energizes whatever responses the subject tends to make to the CS. If this response is a CR, performance is facilitated; otherwise the effect is interfering. The results also suggest that the progress of eyelid conditioning is much more rapid than the ordinary conditioning curve indicates. Conditioning may be complete after as few as three CR's.

Support for this research was provided by a National Science Foundation grant.
Slides.

Division 3. Perception IV

9:50-10:50. Room 2127, Sheraton Palace

FRED ATTNEAVE, Chairman

9:50. Temporal numerosity: a comparison of the major senses. CARROLL T. WHITE AND PAUL G. CHEATHAM, *Human Factors Division, U. S. Navy Electronics Laboratory*.

This paper describes the results of a number of experiments which round out the current series of studies by the authors relating the perceived number of sequentially presented stimuli to the actual number presented as the rate of presentation is varied. The present studies deal with the counting of tactile stimuli, and also further work with visual counting, in which the roles of the rods and the cones in this process are demonstrated.

Four experienced observers were used, and the stimuli were presented in a modified method of limits. The results obtained with the tactile stimuli were almost identical to those previously found for audition, and the limiting perceptual rate for these two modalities also held for vision when the rod responses were minimized by using a high level of light adaptation.

On the basis of all the work to date along this line it is concluded that there is a cyclic process, presumably in the central nervous system, that limits the perceived rate of sensory input. The results of this work also indicate that the present method is well suited for the study of such a process. This method appears to be useful for the study of certain other aspects of vision because of its sensitivity to changes in the state of adaptation of the eye.
Slides.

10:05. Effect of acoustic noise on time judgment. ARDEN K. SMITH, SHELLEY WING, AND HARRY J. JERISON, *Antioch College and Aero Medical Laboratory, Wright-Patterson AFB, Ohio*.

PROBLEM: This experiment is part of a program of research to determine performance variables affected by high energy noise. It was specifically concerned with effects of noise on estimates of temporal intervals.

SUBJECTS: 14 male undergraduates.

PROCEDURE: Subjects were required to press a key at what they judged to be ten-min. intervals while performing a different task involving keeping track of a series of ongoing events. There were three two-hour sessions with each subject, a training session in "quiet" (77.5 db OASL), and two subsequent sessions, one of which was an experimental session (first half-hour "quiet" and the remaining 1½ hours "noise"—111.5 db OASL), and the other a control session with "quiet" throughout. Each subject served as his own control.

RESULTS: (a) Mean time judgments (clock time indicated by the subject as equal to ten minutes) were of the order of seven minutes in "noise" and nine minutes in "quiet." (b) Differences between the experimental and control sessions during the last 1½ hours were significant at the .02 level; corresponding differences for the first half-hour when both sessions were in "quiet" were not significant ($P > .30$). (c) Within the experimental session differences between the first half-hour and the last 1½ hours were significant at the .01 level; corresponding differences within the control session were not significant ($P > .40$). (d) The training and control sessions were not significantly different.

CONCLUSIONS: Time judgments are distorted in a high energy noise field. Since other, unpublished, observations indicate that the task of keeping track of a series of ongoing events becomes subjectively more stressful with time, interpretation of the distortion as a function of "stress" is not consistent with result (c). The results are interpreted in terms of a hypothesis which relates the temporal dimension of behavior to the central neural mechanisms of audition. Slides.

10:20. Relationship between recognition accuracy and order of reporting stimulus dimensions.

DOUGLAS H. LAWRENCE AND DAVID L. LABERGE,
Stanford University.

Stimulus objects differing in color, form, and number of objects were presented tachistoscopically to 80 subjects. Four types of instruction were given: (a) Equal instructions in which subjects were asked to pay equal attention to and to record all three dimensions, (b) Emphasis instructions in which subjects were asked to pay primary attention to one dimension only but to record all three, (c) One Only instructions in which the subjects were asked to pay primary attention to and to record only one dimension, and (d) Ordered instructions in which subjects were asked to pay equal attention to and to record all three dimensions but the order in which they were recorded was specified immediately after the stimulus exposure. The main findings were: (a) the average accuracy of report on all three dimensions combined

differed but slightly between the various types of instruction, (b) under Emphasis instructions the accuracy of report on the emphasized dimension was considerably greater than on the other two, (c) this accuracy on the emphasized dimension was not increased under One Only instructions, and (d) with Ordered instructions the difference in accuracy between the first recorded dimension and the average of the other two was as large as the difference between emphasized and nonemphasized dimensions for Emphasis instructions. It was concluded that the selective effect of instructions on the accuracy of report for tachistoscopically presented stimuli can be accounted for in large part by the following assumptions: (a) a constant amount of information is transmitted irrespective of instructions, (b) the distribution of this between dimensions depends upon the order in which they are reported, and (c) the effect of instructions is to determine which order of report occurs.

10:35. A comparison of normal and brain pathology groups on certain aspects of visual perception under conditions of intermittent illumination. CHARLES W. DEAN, *Methods Engineering Council, University of Pittsburgh.* (Sponsor, Robert A. Patton)

PROBLEM: This study investigated the hypothesis that persons afflicted with brain pathology will perform less efficiently than normals on a visual task characterized by presentation of stimuli under subfusion frequency illumination conditions. Another hypothesis stated that organics would show relatively greater decrement in performance, compared to normals, at slow frequencies than at faster rates.

SUBJECTS: 18 organic and 18 normal subjects were used. A careful attempt was made to match age, education, and intelligence. The organics were of various types and etiologies, but included only one known occipital lobe injury case.

PROCEDURE: A Strobotac and Strobolux were used as the source of illumination. Four frequencies of flash rate were employed, 40 f.p.s., 10 f.p.s., 1 f.p.s., and one flash per three seconds. Stimuli included geometric figures, dot-counting problems, and Snellen charts. The geometric and dot tasks were set up as four-item oddity problems. There were 32 such problems in the geometric series, and 24 in the dot series. The time taken for perception of the odd element and errors were measures of performance. Number of letters accurately read constituted performance on the eye charts. Two frequencies only, 40 f.p.s. and one flash per three seconds, were used with the two equivalent Snellen charts. CFF measurements were also taken, using the Strobotac.

RESULTS: The brain-injured group performed with significantly poorer efficiency than the normals. Dis-

crimination between groups with the geometric and dot problems was generally greater at fast frequencies than at slow. With the Snellen charts, however, differences were significant only at the slow frequency. Error patterns in the groups were very similar. CFF did not discriminate between groups.

CONCLUSIONS: A method of presenting perceptual problems under various illumination input frequencies was shown to be effective in discriminating brain-damaged from normal individuals. The data may be interpreted as contributing to knowledge of visual summation processes.

Division 5. Studies of Tests and Inventories II

9:50-10:50. Comstock Room, Sheraton Palace

ALEXANDER G. WESMAN, Chairman

9:50. Evaluation of an achievement test in the absence of the usual validation criteria: The use of a conceptual consistency design. HARRY BORNSTEIN, BARRY T. JENSEN, *Stanford University*, and LEON G. GOLDSTEIN, *Personnel Research Branch, TAGO*.

PROBLEM: To try out an experimental design by which an achievement test might be evaluated in the absence of a validation criterion.

SUBJECTS: Three groups of Army basic trainees were used: one experimental group of 207 and two control groups of 85 and 63, respectively.

PROCEDURE: A paper-pencil test of achievement in basic military training was administered to the experimental group before and after basic training, and the "gain" scores were the critical data. One control group was used to assess test-retest gains *before* training, and the other to measure test-retest gains *after* training. A series of hypotheses was set up which would hold if the test were in fact "valid." These hypotheses were based on certain relationships to be expected, e.g., that test scores (or gains) reflect motivation, job satisfaction, and amount and type of instruction. Thus, "sensitivity" to these specified influences is taken to be evidence of validity in the usual sense.

RESULTS: Evidence for "sensitivity" or validity consisted in the following findings: (a) generally no test-retest gains were obtained before training, (b) small but consistent test-retest gains were obtained after training, (c) gains from test before training to retest after training were more than 10 times the gains in (b) above, where training did not intervene. Possible shortcomings of the test were indicated by (a) no group differences in gain (from pre- to post-training) between personnel who were inducted and those who enlisted, groups which were presumed to differ in motivation, (b) low reliability of gains on the individual parts of the test, which aborted some of the planned analyses, and (c) evidence that much

of the variance of the test is attributable to conventional paper-pencil test characteristics.

CONCLUSIONS: It was concluded that the experimental design was operationally feasible and would yield sufficient information to allow for a critical evaluation of an achievement measure.

10:05. The College Entrance Examination Board General Composition Test as a measure of writing ability. MARJORIE A. OLSEN, *Educational Testing Service*.

The General Composition Test was designed to provide an essay test suitable for use in a large-scale testing program. In the GCT, a topic is specified. Students are given reading materials for background; they are asked to prepare an outline, to write an essay, and to summarize its theme. Testing time is two hours. A systematic plan for reading the essays is designed to yield scores on five qualities: mechanics, style, organization, reasoning, and content. In May 1954, after extensive experimentation, this test was introduced into the College Board program on a trial basis.

Studies of the May 1954 GCT were carried out in cooperation with eleven secondary schools. These studies sought to compare GCT with the Verbal score of the CEEB Scholastic Aptitude Test (an objective-type examination) with respect to relationships to criteria of writing ability. The criteria were English grades and teachers' ratings; for purposes of this study, teachers at the cooperating schools rated their students on the same five qualities used in scoring GCT. Parallel analyses were carried out for the eleven schools. The studies were based on a total of 617 junior-year students.

The over-all results for the eleven schools indicated that SAT-Verbal had a closer relationship to criteria of writing ability than did GCT. For each of the five qualities, teachers' ratings had higher average correlations with SAT-Verbal scores than with the appropriate GCT scores. The differences ranged from .05 to .25. On the average, the composite rating on the five qualities correlated .51 with the composite GCT score and .65 with SAT-Verbal. English grades also had higher average correlations with SAT-Verbal than with GCT.

10:20. Measured personality differences between engineers employed in several functional types of work. DAVID R. SAUNDERS, *Educational Testing Service*.

PROBLEM: To assess the nature and extent of relationships between personality variables and criteria of job placement and job success in engineering.

SUBJECT: 800 engineers from graduating classes of 1947-50, each employed in one of five companies, and distributed as follows according to type of work and rating of success in job performance: Research—100

high, 50 low; Development—100 high, 50 low; Other technical—50; Operations—100 high, 50 low; Supervision—100 high, 50 low; Sales—100 high, 50 low.

PROCEDURE: Each engineer completed the Personality Research Inventory (PRI) as part of a larger experimental battery. The PRI's were scored using the 25 standard keys.

Analysis of variance was used to relate each of the traits to the criteria; each PRI score was treated, in turn, as if it was the dependent variable. The six types of work (T), two categories of success rating (S), and five employing companies (C), were treated as independent variables; statistical estimates of their main effects and all their interaction effects were obtained and evaluated.

RESULTS: When the effects due to T, S, and T \times S interaction are combined and tested against all other variance, 16 of the 25 PRI scores are significantly related to the criteria beyond the 5 per cent level—seven beyond the 0.1 per cent level—and five to such a degree as not to require cross validation. These are for measures of "Talkativeness," "Status Aspiration," "Impulsiveness," "Gregariousness," and "Liking to Use Mind."

Generally, each significant PRI score shows a different pattern of results. Several scores are related to success, at least for some types of work, but the most significant effect is generally associated with type of work itself.

CONCLUSIONS: The importance is indicated of developing useful measures of five or more personality traits, for placing engineers. The usefulness of the PRI for discovering such facts is illustrated.

Slides.

10:35. The interpretation of the Wechsler-Bellevue Intelligence Scale in terms of altitude scores.

MORONI H. BROWN AND G. ELIZABETH BRYAN,
University of Utah.

PROBLEM: It has been common clinical practice to interpret the highest, or altitude, scores in a test battery as indicative of intellectual potential and the IQ as representative of the level of functional efficiency. However, the altitude score, or the prorated altitude IQ, has been compared with mean performances or IQ norms and no studies have given a normative distribution of altitude scores. The problem of this study was to determine the relationship between Wechsler-Bellevue (W-B) Full Scale (FS) and prorated altitude (Alt.) IQ's in a normative distribution.

SUBJECTS: 270 nonclinic subjects of equal sex representation composed nine age-by-IQ groups of 30 each (ages: 10-15, 16-19, and 20-29; IQ's: below 90, 91-110, and above 111).

PROCEDURE: The mean and *SD* of the differences between the FS and Alt. IQ's (Alt. IQ prorated from the highest two scores) were computed for each of

the nine age-by-IQ groups and for the entire group of 270. The correlation between the FS and Alt. IQ's was computed, using all subjects in the 91-110 IQ groups and half of the subjects in the lower and higher IQ groups. Thus the FS IQ distribution more nearly approached the proportions in the general population.

RESULTS: The mean FS-Alt. IQ differences for the combined nine groups was 24.6, *SD* 8.1 (*SD* between group means = 2.8). Alt. IQ's were always higher and differences were greater for younger subjects in an age-group comparison, and for below 90 IQ subjects in an IQ-group comparison. The correlation between FS and Alt. IQ's was .87, confidence limits between .85 and .89.

CONCLUSIONS: Altitude score interpretations should be in terms of altitude norms. Since differences of 16 to 34 points between FS and Alt. IQ's are common for two-thirds of the general population, differences beyond these limits might indicate unusual relationships between intellectual functioning efficiency and potential capacity.

Division 7. Effects of Infant Experiences

9:50-10:50. Borgia Room, St. Francis

LEONARD CARMICHAEL, Chairman

9:50. A comparative developmental study of form vision by the method of monocular form deprivation. A. H. RIESEN, K. L. CHOW, AND H. W. NISSEN, *The University of Chicago and Yerkes Laboratories of Primate Biology, Inc.*

PROBLEM: Previous experimentation has shown that chimpanzees and cats are "form blind" after early rearing with diffuse light. Human congenital cataract patients are also reported to be slow to utilize form vision after cataract removal. The present paper compares form recognition through one eye, with the other eye as a "control," in kittens and infant chimpanzees which were reared under (a) monocular form deprivation, (b) monocular alternating exposure to forms, or (c) binocular exposure to forms.

SUBJECTS: 15 newborn kittens and six infant chimpanzees.

PROCEDURE: Immediately after birth the animals were put into a darkroom. Depending upon the experimental treatment, diffuse light or patterned light was permitted in the different combinations of monocular or binocular exposure indicated above. Each eye received minimum daily exposure of one hour for the kittens, and one and one-half hours for the chimpanzees.

Testing procedures included formal training on visual discrimination habits, tests for interocular transfer, and "naturalistic" observations of behavior.

RESULTS: The animals with early binocular exposure to forms and those with alternating monocular ex-

posure showed immediate interocular transfer (ocular equivalence) of habits learned monocularly. The kittens and the chimpanzee infants with early monocular exposure to forms, and with the second eye exposed only to diffuse light, failed to show ocular equivalence.

All animals given early exposure to room patterns showed normal recognition and fixation responses when using the previously exposed eye or eyes. They failed to show such responses when using the eye previously exposed only to diffuse light. Normal binocular coordinations were obtained only from the group with early binocular exposure.

CONCLUSIONS: Ocular equivalence requires extended prior exposure of each eye to form stimulation. This indicates that the structural basis for functional equivalence of the two eyes is not fully present in the inexperienced animal.

Simultaneous exposure of the two eyes to patterned light is necessary for full development of binocular coordinations.

Slides.

10:05. The effects of shock and handling in infancy on adult avoidance learning. JACQUES A. CHEVALIER AND SEYMOUR LEVINE, *Michael Reese Hospital*.

PROBLEM: Clinical studies have led to the view that trauma in infancy affect later behavior and may underlie manifestations of anxiety in adults. The aim of the present investigation was to study the behavior of animals, subjected to the trauma of electric shock in infancy, when confronted with a fear-eliciting avoidance learning task in adulthood.

SUBJECTS: 60 Sprague-Dawley rats, bred in our laboratory.

PROCEDURE: 24 subjects received shock (Shock group) and 24 subjects were placed on the grid but received no shock (No-Shock group). Treatments were administered daily from the day following birth to Day 20. The third group of 12 subjects (No-Handling group) received no handling whatsoever from birth to weaning. All subjects were weaned at 21 days and received minimal handling thereafter. Avoidance training in a two-compartment box was initiated at 60 days. A 3-sec. CS and a 30-sec. CS-UCS interval were used, with electric shock as the CS. Subjects were given one trial per day. Following learning, the door between compartments was locked and the response of pushing against the door following the CS was extinguished.

RESULTS: The No-Handling group was clearly and significantly inferior to the other two groups in training trials and in errors. The Shock group was intermediate on all measures. The No-Shock group made significantly fewer total errors than did the Shock group. The proportion of No-Shock subjects reaching extinction within an arbitrarily defined number of trials (77 trials) was significantly larger when com-

pared with the proportion for the Shock Group. The No-Handling subjects were not extreme on this measure.

DISCUSSION: The absence of extrinsic stimulation in infancy, it is believed, rendered the No-Handling subjects more susceptible to emotional disturbance when presented with new stimuli, which then contributed to their slowness in learning the avoidance problem. Alternative hypotheses concerning the effects of shock in infancy are presented, attributing the decrement in learning either to a direct disruption of cognitive ability or to a heightening of anxiety drive to an excessive level.

Slides.

10:20. Restricted experience and "timidity" in the rat. HOWARD F. HUNT AND LEON S. OTIS, *University of Chicago*. (Sponsor, H. F. Hunt)

This experiment studied the effect on adult performance in two tests of "emotionality" of differences in the diversity of experience during infancy and early maturity. Thirty-nine albino rats served as subjects. Nineteen of these served in the restricted (R) group. After weaning, these subjects lived in standard wire cages, undisturbed except for standard care, until they were weighed for the first time at 317 days of age. The remaining 20, in the "experience" (E) group, were handled twice daily from the seventh through the 21st day of life, weighed seven times between Days 7 and 32, and weighed six times between Days 33 and 136. Then the E subjects lived in steel-walled cages with slits for ventilation, undisturbed except for standard care, until the final weighing at 339 days of age.

Then, each subject received an "open field" test, modified after Hall, and a "timidity" test. In this, the motivated subject was to emerge from the standard wire starting cage and retrieve one or more pellets of food placed 12, 20, and 30, in. out on a runway extending from the front of the cage.

The groups differed neither significantly nor appreciably in defecation in the open field. In the "timidity" test, however, the groups differed appreciably and significantly. For example, 12 of the E but only one R animal emerged and retrieved a pellet; and 15 R and only three E subjects remained in the starting cage for the 30-min. test period.

These data were interpreted as suggesting that the restricted animals were somewhat more susceptible than the "experienced" animals to emotional disturbance too mild to produce emotional defecation but sufficiently strong to interfere with the output of normal behavior in the "timidity" test.

Slides.

10:35. Discussion.

HARRY F. HARLOW, *Discussant*

Division 10. Psychological Aesthetics

9:50-11:50. Room 261, St. Francis

RUDOLPH ARNHEIM, Chairman

9:50. The basis of the aesthetic response. HELMUT HUNGERLAND, *California College of Arts & Crafts.*

An analysis of currently accepted definitions of aesthetic value and of the aesthetic attitude shows that none of them are very helpful in determining the aesthetic merit of a given work of art. The definitions of aesthetic value are, on the whole, in terms of responses of a percipient. However, since the response is not the value, a definition which merely refers to a percipient's response does not clarify exactly what the aesthetic value is and how its experience is brought about. There are three major sources of the confusion so often besetting discussions of aesthetic value: (a) the linking of aesthetic value with pleasure instead of with the wider notion of a positive response, (b) the disregard of the cultural conventions within which the traditional definitions of aesthetic value were developed, (c) the failure to distinguish the socially prescribed responses to works of art from the aesthetic function of components within a work of art. It is suggested that the positive response in question is the satisfaction experienced by a percipient when apprehending the achievement of the aesthetic objective. The aesthetic objective is defined in terms of tensions generated by an experienced discrepancy between the artistic (artificial) arrangement of colors and shapes and the memory of the depicted phenomenon as it appears to veridical perception.

Slides.

10:10. The psychological conditions underlining the discovery of perspective. ERWIN W. STRAUS. *Veterans Administration, Lexington, Kentucky.* (Sponsor, James S. Calvin)

In the history of European painting, perspective drawing is reported as an invention connected with the names of individual artists. If one defines perspective drawing as the art of representing in one plane distinct objects as they appear to the human eye, one may well wonder why the discovery came so late. A method of presenting things as they appear to the human eye, it seems, need not be discovered. Yet, Brunelleschi's invention was received by his contemporaries enthusiastically as a bold and surprising innovation. There are technical problems involved. However, the artists and architects who built the cathedrals had mastered technical problems of no less difficulty in preceding centuries. The lack of any prior attempts to find a solution clearly indicates that the problem as such had not emerged.

The discrepancy between physiological and psychological optics, between the what and how of seeing, was not noticed as a disturbing factor during the earlier epochs. Indeed, the painter eager to reveal the relation of the human city to the Celestial City had little use for perspective drawing. A revolutionary change of the mode of existence first made the change of artistic style possible, and with it the innovation. In their individual actions and accomplishments the inventors were guided by general attitudes, religious and cosmological views, that dominated their era.

Discovery of perspective painting preceded the invention of projective geometry; artistic vision anticipated scientific thought. This is no exceptional case, as shown by the further development of perspective drawing.

10:30. Symbolic process in the art of psychotics. JOHN W. PERRY, (Sponsor, T. A. Pasto)

From the standpoint of analytical psychology, psychosis is considered an irruption of the archetypal material of the collective unconscious into consciousness, flooding it and overwhelming the ego. Delusions are made up of this material, and are treated just as dreams are. The drawings and paintings of psychotic patients usually contain representations of the same sort of imagery as their delusions, and make a helpful way of handling their unconscious problems in therapy.

The symbols in this kind of art are considered meaningful in the sense that they express intimations of things still not known or acceptable or understandable to the patient's consciousness. They are functional components of the unconscious, which reveal on the one hand the pathology concerned, i.e., what happened to these in relation to the parents, but on the other hand and even more importantly, the developmental possibilities, i.e., what is now happening in order to grow free of all injurious or hampering influences. In order to handle this material effectively, the therapist needs a knowledge of comparative mythology and symbolism. In this case a series of drawings will reveal a sequence of symbolic expressions describing processes of regression or progression, ultimately striving toward the ordering and fulfilment of the psyche.

These unconscious art productions are of use not only diagnostically but therapeutically, in that they afford a way of concentrating on the archetypal symbols. By giving them consistent attention, the symbolic problems take shape and proceed toward resolution in certain cases. By thus objectifying them, the ego can disentangle from its identifications with them, and withdraw the projections of them. Also, it gives a most meaningful way of communication between

patient and therapist over those contents and pre-occupations which are most dynamically of concern to the patient in the psychotic phase of the disorder.

The manner of eliciting, participating in, and interpreting this material is discussed, and comments are made both as to characteristic content and form, and these are found to raise interesting problems concerning the relation of aesthetics to the integrative ordering processes of the psyche.

10:50. The problem of metaphor. FRANKLIN FEARING, *University of California, Los Angeles.*

It is generally agreed that metaphor is one of the most pervasive of linguistic devices. In spite of the Western European cultural tradition which relegates its use to poetry, it is embedded in popular speech and even science utilizes it. Until recently, except for the pioneering work of Heinz Werner and his co-workers, it has received relatively little attention from psychologists. The study of the problems of metaphor is a cross-disciplinary undertaking involving psychological, linguistic, anthropological, and humanistic approaches.

The present paper is concerned with the definition of the problem and clarification of terms. Among the problems briefly discussed are (a) the relation of metaphor as a linguistic device to other structuring activities of the organism, (b) the place of metaphor on the perceptual-cognitive continuum with special reference to its relation to physiognomic perception and the general "expressive" character of perception, (c) the feeling or affective component in metaphor as ordered to the concept of tension and tension reduction, (d) the essential creative character of metaphorical processes, (e) the role of metaphor as a structuring and rhetorical device in social communication, (f) the relation of metaphor to the "world views" found in both literature and nonliterature cultures with special reference to the theories of Benjamin Whorf, (g) the validity of the distinction between metaphorical ("motive") and nonmetaphorical uses of language.

Extensive use is made of the formulations of such psychologists as Werner and Arnheim and such professional literary critics as Richards, Empson, and Burke.

11:10. A psychological analysis of the musical response. MORTON J. KESTON, *University of New Mexico.*

The purpose of this paper is to explore some of the psychological components which enter into the musical response and to suggest another approach to the understanding of the musical thought processes. The musical response is at once intellectual and emo-

tional. Intellectually, tones are heard in a gestalt which is simultaneous and successive. The mind of the listener actively apprehends and organizes the pattern of tones into a meaningful complex. The emotional component of the response is more intangible than the intellectual and may be characterized as a precise emotional experience which is relevant, universal, and dependent upon the interaction of a complex tonal sequence and a properly receptive nervous system.

There are universal processes, responses, or perceptions in the make-up of the human nervous system, and it is these sensibilities or sensitivities which account for the musical response. One of these sensitivities, for example, is experienced when two tones a perfect fifth apart are played one after the other, for only one of the tones is judged acceptable as a proper resting tone or final tone of the series. In gestalt terminology, the quality of "coming to rest" or "not coming to rest" which characterizes one or the other of the two tones depends on a relationship which exists between any two tones a perfect fifth apart. As the gestalts would point out, the relationship between the two tones is more important than the identity of the tones themselves.

It is evident that the organizational principles of gestalt psychology open the door to methods of analysis of musical structures of considerable complexity, and a thoroughgoing system of musical analysis based on these principles would contribute to the understanding of the dynamic perceptive powers of the human mind as it responds to the flood of tones which pours into the nervous system when music is heard.

11:30. Discussion

Division 14. Symposium: Practices and Problems in Handling Test Results of Management Personnel

9:50-11:50. Empire Room, Sir Francis Drake

ORLO L. CRISSEY, Chairman

Participants:

VERNON JON BENTZ, HARRY L. CODERRE, EDWIN E. GHISELLI, HERBERT H. MEYER, AND JAROLD R. NIVEN.

Division 3. Human Learning III

11:00-12:00. English Room, Sheraton Palace

DONALD A. RILEY, Chairman

11:00. Interserial interference in intentional and incidental learning. PAULINE AUSTIN ADAMS AND LEO POSTMAN, *University of California, Berkeley.* (Sponsor, Leo Postman)

PROBLEM: Retroactive and proactive inhibition under conditions of intentional and incidental practice.

SUBJECTS: 400 undergraduates assigned to the experimental conditions at random.

PROCEDURE: The stimulus materials were two lists of 20 nonsense syllables. The experimental design comprises the conventional conditions for the determination of retroactive and proactive inhibition. The work conditions represent all possible combinations of intentional and incidental practice for the two lists, i.e., the following sequences of practice conditions were used: Intentional-Intentional, Incidental-Incidental, Intentional-Incidental, Incidental-Intentional. The orienting task used to expose all subjects to the learning materials consisted of giving meaningful associations to the stimulus items. Recall was tested by the method of free recall.

RESULTS: All retroactive inhibition groups showed significant amounts of interference. When interpolated learning was intentional, there was more retroactive inhibition than when the interpolated learning was incidental. Materials originally learned under intentional and incidental conditions were equally susceptible to retroactive inhibition. Proactive inhibition was significant only if both lists were learned intentionally. Intentional practice resulted in a larger amount of learning than incidental practice and hence was a more effective source of interference. Materials learned selectively under incidental conditions were at least as resistant to interference as intentionally learned materials.

Slides.

11:15. Variables determining degree of incidental learning. MAVIS PLENDERLEITH AND LEO POSTMAN, *University of California, Berkeley*. (Sponsor, Leo Postman)

PROBLEM: This experiment investigates the verbal and discriminative habits favoring incidental learning. These habits are assumed to be partly independent of those functioning in intentional learning. Factors of major importance in incidental learning are: (a) effectiveness of differential responses to the stimuli, and (b) ability to maintain a multiple set, since the subject must both perform the orienting task by which he is exposed to the materials and fixate the stimulus items. The relationships between incidental learning, intentional learning, and measures of these factors were determined.

PROCEDURE: 100 subjects participated in four experimental procedures: (a) Incidental learning of 20 nonsense syllables while matching the syllables with geometric designs during one exposure of the series.

(b) Intentional learning of another series of 20 syllables. Retention was tested after each of four presentations. (c) Symbol discrimination under a single and multiple set. Slides showing three types of symbols were exposed tachistoscopically. During the first half of the series, subjects were set to discriminate one type of symbols only; during the second-half subjects were set to discriminate two types of symbols. Differences in discrimination between the first and second half of the series measure ability to maintain a multiple set. (c) Solution of a series of anagrams. Performance measures ability to differentiate unfamiliar stimuli.

RESULTS: (a) Proficiency in maintaining a multiple set in discrimination correlates significantly with incidental but not with intentional learning. (b) Proficiency in the anagram task correlates significantly with incidental but not intentional learning. Variations in the ability to differentiate stimuli become important when learning is weakly motivated. (c) The correlation between incidental and intentional learning increases as a function of the number of intentional learning trials. The factors favoring incidental learning also gain importance for intentional learning as the products of the latter grow in complexity.

Slides.

11:30. Incidental learning of stimulus frequencies in the judgment of single stimuli. ALLEN PARDOCCI, *University of Oregon*. (Sponsor, Robert Leeper)

This experiment was concerned with the information acquired while making "absolute" judgments of a set of stimuli. The subjects, 275 college students, each judged two series of cards selected so that experience with the first series would tend to anchor subsequent judgments of the second series. Different groups of subjects made their judgments under different sets of instructions in accordance with a factorial design with three variables: (a) the dimension upon which the subjects were instructed to judge the second series—either in terms of the size of each card or in terms of the numerosity of the dots printed at the center of each card (the two dimensions were uncorrelated), (b) whether both series were judged on the same dimension (intentional groups) or on different dimensions (incidental groups), and (c) whether estimates of the relative frequencies of the first-series stimuli in regard to the dimension judged for the second series were made by "recall" (stimuli not present for the estimates) or by "recognition" (stimuli present) or whether subjects proceeded directly to the second series without making these frequency estimates.

It was found that exposure to the first series had a greater anchoring effect upon judgments of the second series for the intentional than for the incidental groups. Although comparison with control groups indicated that even the incidental groups showed significant learning of the relative frequencies of the stimuli in the first series, the intentional groups learned these frequencies with much greater accuracy. The superiority of the intentional groups in this respect showed up more strongly on the recognition than on the recall tests. These results were consistent with the assumption that "absolute" judgments reflect what the subjects have learned about the relative frequencies of the stimuli they are judging.

11:45. "Learning without awareness" in a Thorndikian situation. JERRY HIRSCH, *University of California, Berkeley*.

PROBLEM: A study of (a) the effectiveness of rewards and punishments in producing learning without awareness, and (b) the threshold of awareness as a function of amount of reinforcement (AR), type of reinforcement (TR), number of reinforcements (NR), number of trials (NT), and number of correct responses (NC).

SUBJECTS: 126 undergraduate students randomly assigned to six experimental groups and one control group.

PROCEDURE: Each subject served individually. He was presented with a series of words and required to respond with a number from one to nine. The response was called "Right" if the number was equal to one less than the number of letters in the stimulus word. All other responses were called "Wrong." There were 324 different stimulus words varying in length from two to ten letters. They were arranged in 36 blocks of nine each. The experimental groups formed a 2×3 factorial design (67 per cent and 100 per cent reinforcement by reward, punishment, and reward plus punishment).

RESULTS: The response measures used for the analysis of the acquisition data were NT, NC, and NR. The response measure for the nonreinforced (extinction) trials was NC. Acquisition: the only significant differences found between the AR groups were on the measure NR when corrected by covariance for either NT or NC. All differences between the TR groups, however, were significant. Extinction: no significant differences were found between the AR groups. The analysis of the TR groups showed significant differences which were accounted for when the groups were corrected for either NT or NC, the two measures of frequency, whereas when these same groups were equated for NR, the differences were greatly increased.

CONCLUSIONS: In learning without awareness frequency of presentation, frequency of experience, and reinforcement are effective acquisition variables. Frequency is more effective than reinforcement in maintaining resistance to extinction.

Slides.

Division 3. Perception V

11:00-12:00. Room 2127, Sheraton Palace

ALPHONSE CHAPANIS, Chairman

11:00. A multidimensional scaling model for absolute judgments. BERT F. GREEN, *Massachusetts Institute of Technology*.

This paper presents a method for scaling stimuli in two dimensions and also presents a general scaling model for any number of dimensions. The scale is based on the errors made by subjects in an absolute judgment experiment, which may be summarized in a matrix of proportions showing, for each stimulus, the proportion of times it was identified as each other stimulus.

In the general model, each stimulus is represented by a normal probability distribution in an n -dimensional space. The space is divided into response regions, one for each stimulus. The probability of response j , given stimulus i , is given by the integral of the i -th stimulus distribution over response region j . In order to simplify the model, it is assumed that all covariances are zero and all variances are equal. The coordinates of the means of the stimulus distributions, which comprise the scale, must be estimated from the data. The first step is to use the data to estimate the distance from each mean to each other mean. Standard procedures can then be used to find the coordinates.

In the general model no method is known for estimating the distances unless a separate two-stimulus experiment is done for each pair of stimuli. For the two-dimensional model, a method is known for estimating the distances. This method is presented in detail. A numerical example is also presented to illustrate the method. A chi-square test of goodness of fit is described.

11:15. The relation of extremity of judgment to decision time with a multicategory response scale. JOE K. ADAMS AND KATHLEEN CHAN, *Bryn Mawr College*.

PROBLEM: Cartwright, Postman, and Zimmerman, and others, have demonstrated that, for a given individual, decision time is inversely related to extremity of judgment, when responses are restricted to two categories. This experiment investigated this relationship with responses less restricted; under these conditions

the relationship is much less predictable, either on a common sense basis or on Cartwright's theory.

SUBJECTS: 20 Bryn Mawr College undergraduates.

PROCEDURE: The name of a personality trait was read to the subject, who rated the trait on each of eight dimensions, each represented by a scale running from one to six, these points being defined in words. The subject was allowed to give a rating in between any two points or even to indicate "can't decide." There were 12 trait names, each subject giving 96 ratings. Each rating was timed with a stop watch; a check showed that no subject was aware of having been timed.

RESULTS: For each subject the median decision times for categories one and six (combined), two and five, and three and four were computed. Eighteen of the 20 subjects had the shortest median decision time for one and six and the longest for three and four. All three *t* tests were significant at the .05 level or lower, sign tests at the .001 level.

CONCLUSIONS: Subjects consistently tend to have shorter decision times for relatively extreme judgments, even with fairly unrestricted response categories. These results can be interpreted in terms of Hullian theory, equating decision time with response latency and extremity of judgment with magnitude of response, or in terms of Cartwright-Lewinian theory, assuming that judgments near the center of the scale involve a relatively greater differentiation of the psychological field, and that the decision process, having to take account of relatively more determining factors, requires a relatively longer time.

Slides.

11:30. Statistical properties of the word-association experiment. DAVIS HOWES, *Operational Applications Laboratory, Bolling AFB, Washington.*

The effect of a stimulus word in the word-association experiment is conceived as a superimposition on the probability of emission of words due to other factors. The average of this latter quantity, taken over a long time interval and a large population of subjects, is the *base probability* and is estimated from the Lorge magazine count. According to this view, the total frequency of a word in a set of association tables, taken without regard to stimulus word, should equal its base probability. A correlation of 0.94 is actually found in the case of the Kent-Rosanoff tables. Exceptions to this law are connective words (conjunctions, articles, prepositions, etc.) of very high base probability. These exceptions can be attributed to the instructions used in the experiment.

This conception of the association process implies that the latency of an association depends only on the

probability of emission of the response word. It is shown that the distributions of latencies are logarithmic-normal with constant variance. Each distribution can therefore be characterized by a single parameter. Latency is found to depend on the base probability of the response word as predicted. The well-known correlation between latency and associative probability (Marbe's law) logically follows. The mathematical form of these relationships is discussed.

The base probability of the stimulus word is theoretically independent of the base probability of the response word. It should therefore be independent of the associative probability also. Both results are confirmed by data. Mean response frequency and mean log response frequency (entropy) are used in testing this independence. Since latency depends on the probability of the response word, it also should be independent of the base probability of the stimulus word. This is found to be true empirically. A simple explanation of certain paradoxical results of experiments on verbal recall follows from this observation. Implications for other experiments employing the association technique are also discussed.

Slides.

11:45. Time uncertainty in simple reaction time.

EDMUND T. KLEMMER, *Operational Applications Laboratory, Bolling AFB, Washington.*

By definition the only uncertainty the subject has in a simple RT test is time uncertainty. He knows exactly what the stimulus will be and what the response will be. He does not know when the stimulus will be presented.

The subject's time uncertainty is the result of both his own imperfect time-keeping ability and the clock-time variability of the stimuli. The first factor varies with the foreperiod length and the second is defined by the foreperiod variability.

The present study investigated both the effect of systematic changes in foreperiod variability and mean foreperiod upon RT. Six trained subjects were given a total of more than 20,000 trials in the main experiments. The results were analyzed in terms of the length of immediate foreperiod and previous foreperiod in each test run as well as mean foreperiod and foreperiod variability.

Additional tests determined the effect of uncertainty in the time of occurrence of the warning signal and the effect of randomly spaced stimuli with no warning signals.

Marked discrepancies between the findings of this study and often quoted previous studies will be discussed. An attempt will be made to relate time uncertainty to an amount-of-information measure.

The results of the present study show that RT is a direct function of foreperiod variability and of mean foreperiod above one second. In any run, the immediate foreperiod influences RT only if the previous foreperiod is different from it, and then only slightly. The striking finding in all tests with variable foreperiod is that the important determiner of RT is not the immediate foreperiod but rather the distribution of foreperiods within which it is embedded.

Time uncertainty in the warning signal over an eight-second range is relatively unimportant.

Slides.

Division 5 and Psychometric Society. Factor Analysis Techniques II

11:00-12:00. Comstock Room, Sheraton Palace

HARRY H. HARMAN, Chairman

11:00. Nonlinear factor analysis, single factor case. W. A. GIBSON, *Center for Advanced Study in the Behavioral Sciences*.

Recent developments in the unidimensional continuous case of Lazarsfeld's latent structure analysis make it possible to write equations of curvilinear regression of dichotomous attributes on a single continuum. This generalizes to quantitative manifest measures just as does the discrete class latent structure case.

The correlation matrix (essentially of rank r) is augmented symmetrically by higher-order product moments that raise its rank nontrivially to q . Analogous augmentation is applied to triple product-moment matrices. A discrete class analysis then yields $q+1$ latent classes whose relative sizes and average score profiles reproduce, essentially, the manifest product moments.

Define

L = the $q+1$ by $n+1$ *latent profile* matrix given by the discrete class solution. Each row of L has a first entry of 1 followed by the profile of average standard scores of the corresponding latent class on n tests.

X = the $q+1$ by $r+1$ *locator* matrix whose columns contain successive powers (from zero to r , inclusive) of the positions of the latent classes along the underlying continuum.

C = the $r+1$ by $n+1$ *coefficient* matrix, each of the last n columns of which contains the coefficients of successive powers in the r -order polynomial regression equation for the associated test. The first column of C is a 1 followed by r zeros.

Then

$$L = XC.$$

Given an L where q and n exceed r , X and C are uniquely separable except for a linear transformation of the scale of measurement.

This approach has neither communality nor rotational problem. It provides an answer to the repressed dilemma of difficulty factors. It yields, without normality assumptions, an interval metric for the latent continuum. Perhaps it will stimulate the development of nonlinear multifactor analysis.

11:20. An analytic rotational criterion for factor analysis. HENRY F. KAISER, *University of California*. (Sponsor, Charles Wrigley)

It would seem that a factor is most easily interpretable when the number of very small and very large loadings is maximized, e.g., when the dispersion of the squared loadings is as great as possible. As a quantitative index of the interpretability of a factor, then, we may consider the variance of its squared loadings:

$$v_s = [n \sum_{i=1}^n (a_{is}^2)^2 - (\sum_{i=1}^n a_{is}^2)^2] / n^2.$$

More generally, the interpretability of an entire factor matrix might be considered "best" when

$$V = \sum_{s=1}^m v_s$$

is a maximum. For orthogonal factors, maximizing V is an elementary calculus problem. We choose any pair of factors, x and y , say, and maximize $v_x + v_y$ in the xy plane. Systematically varying x and y will, in general, lead to maximum V .

Under the restriction of orthogonality this criterion has been applied to a number of well known factor matrices: all of Holzinger's textbook examples, Thurstone's box problems, Thomson's "simple structure" example, and the Burt-Pearson matrix of seven physical variables. These results are compared with the original subjective solutions and with "Quartimax" solutions. (The Quartimax method, developed by Neuhaus and Wrigley, Saunders, Carroll, and Ferguson, is an analytic procedure very similar to the one proposed here—calling for the maximization of the variance of *all* the squared loadings simultaneously.)

Our results seem to correspond rather closely with what Holzinger would call a "multiple-factor pattern" or Thurstone would call "simple structure." They seem superior in this sense to the Quartimax solutions; the present method is much less likely to give a general factor.

11:40. The factor analysis of ranked data. JOSEPH F. BENNETT, *Massachusetts Institute of Technology*.

Thurstone has suggested that factor analysis might transform test scores into ranks and then factor these ranks directly, without using correlations or matrices. This suggestion is examined and its advantages and difficulties discussed. Two results bearing on the problem are given: (a) The number R (Sd) of different ways in which s subjects can be ranked by linear functions of d factors is shown to equal $R(s-1,d) + (s-1)R(s-1,d-1)$. (b) Every set S of $d+2$ subjects can be uniquely separated into two subsets, S^* and $S - S^*$, such that no linear function of d factors can rank all the subjects in S^* above all the subjects in $S - S^*$. Using these results, the scores in Thurstone's "box problem" are ranked and factored, and three dimensions are found to be operating. Problems of future development are discussed.

Division 7. Parent-Child Relationships

11:00 A.M.-1:00 P.M. Room 210, St. Francis

ROBERT J. HAVIGHURST, Chairman

11:00. Scales for measuring general orientations of parents toward children. RICHARD Q. BELL AND EARL S. SCHAEFER, *National Institute of Mental Health, National Institutes of Health*.

Orlansky's review of studies attempting to relate maladjustment in children to parental attitudes on specific practices such as breast feeding indicates essentially negative results. On the other hand, studies by Shoben, Mark, Freeman, and Grayson, using questionnaires based on more general orientations toward children, have been uniformly successful in postdiction—relating parental attitudes to children's adjustment problems assessed after the fact of their eruption and social identification. Implications are that an adequately calibrated comprehensive questionnaire based on the latter approach could be used in a variety of situations where parental personality is to be related to behavior in children either in cross-sectional or longitudinal studies.

A pattern-type parental attitude research instrument (PARI) consisting of 28 six-item scales has been developed to meet this need. Scale development was initiated with postdictively validated items used in previous studies or concepts developed from relatively adequate clinical studies. The original list of concepts was revised and supplemented by successive experimentation with small populations prior to final normative work. It was considered that an instrument yielding a pattern of scores based on brief, individually reliable scales would have the following advantages: (a) avoid basing theory on unreliable responses to single items, (b) approximate diversity

of approach possible with variety of individually treated items, (c) provide for direct testing of pattern differences between parental groups, (d) avoid using item-weighting procedures which capitalize on chance and therefore require use of cross-validation groups.

Since the most meaningful validation of such an instrument depends on longitudinal studies, effort was concentrated on the development of homogenous scales. Reliabilities range from .60 to .85. Their development and content will be discussed, based on responses of 500 primiparous, multiparous, and unmarried females.

11:15. Parental responses to affect in self and children. ALVYN M. FREED AND CARSON McGuIRE, *University of Texas*.

PROBLEM: To test the proposition that parental reactions to expressions of feelings are a function of the kind of affect perceived, of the locus in self or a child, and of mediation processes acquired in a sex role and/or life style.

SUBJECTS: 30 mothers and 30 fathers of children in elementary schools with subsamples of 10 females and 10 males representing UM, LM, and UL life styles.

PROCEDURES: Each parent sorted two 64-item Q samples, for self and child, and responded to 16 stems of a sentence completion instrument (SCT). Four areas of affective behavior in Q samples and SCT were aggression, autonomy, apprehension, affiliation. For Q samples, each kind of affect was expressed in four valences (acceptance, rejection, ambivalence, neutrality) yielding 16 AV categories replicated four times. The 16 independent responses to SCT stems by each subject were analyzed by three judges for valence of expression.

RESULTS: A test of homogeneity within AV categories demonstrated the reliability of Q values assigned by subjects to Q statements sorted in a system of nine tied ranks. Judges' assessments were reliable and responses to the Q samples were empirically valid in terms of agreement between SCT reactions and Q values. Reactions of parents to child and own behavior varied according to kind of affect perceived (AVQ). Significant interactions indicated that mediation processes associated with experience in a life style (AL, VL) were independent of those in a sex role (VS).

CONCLUSIONS: Acceptance of expressions of affective behavior varies from one area to another and according to locus in the self or one's child. Frequency of exposure to educative media (UM, LM compared to UL) and response patterns learned in a sex role also modify parental reactions, mothers being more acceptant than fathers.

Slides.

11:30. The effect of sibling birth on the expression of aggression in doll play. FRANCES G. ORR, *Institute of Child Welfare, University of California, Berkeley.*

PROBLEM: To determine the influence of the recent birth of a sibling upon a young child's fantasy aggression: changes in amount of aggression and in choice of agents and objects of aggressive acts, and the relationship of such changes to the child's current behavior in his home and to the child-rearing methods used by his parents.

SUBJECTS: Experimental group of 50 first-born children ages 2½ to 6 years who acquired a sibling; control group of 24 only children matched for age, sex and father's occupational status.

PROCEDURE: Two sessions of doll play were conducted, one before and one after the sibling's birth. Experimental and control groups were compared for net change from first to second session of percentage of play actions which were aggressive and of proportion of aggression channeled through each doll agent and against each doll object. Children who increased aggressive use of each doll were compared with children who decreased to determine differences in their mothers' interview reports of behavior since the birth and of child-training methods.

RESULTS: Children who have recently experienced the birth of a sibling are more aggressive in doll play; they more frequently portray a child doll as the aggressor and direct more aggression against doll furniture. Children who seek more dependency gratifications from their mothers use the mother doll less frequently in aggressive contexts; children becoming less dependent, more frequently. Children who do not turn to mother but become immature and demanding more frequently make the father doll the aggressor and victim. High parental obedience standards are associated with increased aggression against the child doll; lenient standards, against baby doll; and inconsistent, against the father doll.

CONCLUSIONS: The increased fantasy aggression of children with a new sibling is channelized according to how they try to satisfy dependency needs and to the parental standards of obedience.

11:45. Discussion.

12:00. Effects of social class position on child-rearing practices and child behavior. MARTHA STURM WHITE, *Carmel, California.*

PROBLEM: In recent years, there have been a number of studies of the influence of social class on child-rearing practices. More recent studies have shown discrepancies from earlier ones, particularly in the area of permissiveness. One purpose of this study is to compare middle-class and working-class mothers

in this sample with those described by Havighurst and Davis, and E. Maccoby and P. Gibbs, and to suggest some reasons for the changes in middle-class behavior.

SUBJECTS: 74 mothers who had one preschool child, age 2½ to 5, and the 74 children.

PROCEDURE: The mothers were interviewed on two occasions for a total of about four hours. The children took standard tests and engaged in doll play while their mothers were interviewed. Families were rated on an index of socioeconomic status (based on the Warner scale of occupation and income). Approximately half were middle-class and half working-class.

RESULTS: Middle-class mothers permitted more aggression against parents ($p = .001$), were less severe in toilet training ($p = .02$), would occasionally drop subject rather than always carry through ($p = .02$), were more responsive to their baby's crying ($p = .02$). Middle-class mothers were rated as significantly more secure, dominant, and less dependent. Middle-class mothers more often wanted their child to be "well adjusted" ($p = .02$), while working-class mothers more often mentioned "good" or "nice" ($p = .01$). Middle-class children were more often reported as thumb sucking, while working-class children were reported as nail biting ($p = .02$).

CONCLUSIONS: These findings, together with others to be mentioned, point to a need for revising our ideas about social class differences in child-rearing practices.

Reasons for the changes are discussed, as well as evidence for a more dynamic concept of social class.

This study was done under a U. S. Public Health Research Grant, M-836, M. H. 1.

12:15. A study of dependency and achievement drives related to symptoms and developmental stages in early childhood. E. K. BELLER, AND SUZANNE R. HAMBURGER, *Council Child Development Center, New York, N. Y.*

PROBLEM: This study investigated specific relationships of dependency and achievement drives to (a) symptomatology, and (b) oral, anal, and genital behavior manifestations in preschool children.

SUBJECTS: 52 emotionally disturbed children (25 boys and 27 girls) from a therapeutic nursery, ranging in age from 30 to 78 months, were included in the study.

PROCEDURE: Dependency scores were derived from rating measures of seeking help, physical contact, and nearness, recognition, and attention. Achievement-drive scores were derived from rating measures of initiating activity, overcoming obstacles, completing activity, and deriving satisfaction from work. Repeated ratings were carried out over a 2½ year period. The average coefficient of reliability was

$\rho = +.83$. The children were divided into high- and low-dependency groups, and into high- and low-achievement drive groups, by a graphic method applied to a scattergram. Children diagnosed as schizophrenic were put into a separate group. These groups were compared (a) on frequency of symptoms which these children's parents stated in diagnostic interviews (average coder agreement was $+.96$), and (b) on incidences of 16 oral, nine anal and 15 genital behavior manifestations recorded by nursery teachers (average agreement among coders was $+.93$).

RESULTS: (1) The correlation between summed dependency and summed achievement scores was $\rho = +.01$. (2) The high achievement group showed significantly less symptoms than the low achievement group by paired-replicates tests ($p < .05$); while the psychotic group showed significantly more symptoms only when compared with the high achievement and low dependent groups ($p < .01$), but not when compared with the high dependent and low achievement groups. (3) (a) The high dependent and low achievement groups showed a significantly higher incidence ($p < .01$ to $p < .05$) of oral and anal manifestations when compared with low dependent and high achievement groups in that order, whereas none of the group comparisons on the genital behavior manifestations reached significance. (b) The high dependent group ranked highest on oral, the low achievement group on anal behavior manifestations.

Slides.

12:30. Family patterns correlated with adolescent personality structure. ROBERT F. PECK, *University of Texas*.

From all children in "Prairie City" aged ten in 1942, 34 were chosen for intensive study, 1942-1950. Equally divided by sex, they ranged evenly across the full scale of personal adjustment, in the total group. Data included annual interviews with subjects and with their parents, peer and teacher sociometrics, varied inventories, TAT's, Rorschachs, a Sentence Completion *et al.*

In 1946 a research staff of 12 rated the 34 families on emotional relationship and regulatory variables. In 1950 a different staff of ten rated the adolescents on personality variables, without knowledge of the family ratings.

The family ratings were then intercorrelated and factored, yielding four trait clusters: Consistency of Family Life, Democratic Child Rearing, Mutual Parent-Child Trust and Approval, Parental Severity. The factored adolescent personality ratings yielded six clusters: Ego Strength, Supergo Strength (behaviorally effective conscience), Willing Social Conformity, Spontaneity, Friendliness, and a Hostility-

Guilt Complex. Subjects' scores on each personality vector were computed, then correlated with the families' scores on each family vector.

From the significant correlations, Ego Strength appeared to vary directly with the combination of Mutual Trust (.74) and Consistency (.56) in the family; so did Social Conformity (.60, .53). Supergo Strength seemed derived from a similar combination, but with reversed emphasis: Consistency (.50), Trust (.33). Spontaneity came from a combination of Democracy and Trust (.44, .33), plus a relative lack of Severity (-.38). Friendliness varied with familial Trust and Democracy (.44, .33). Hostility-Guilt seemed derived from Severity (.40) combined with a lack of Trust or Democracy (-.40, -.40).

Thus, across the full range of personality integration and social responsibility, these diverse adolescents' personalities proved logically and quite systematically related to the emotional relationships and the disciplinary patterns in their families. The specific patterned relationships found all tend to corroborate present-day theories of personality development.

12:45. Discussion.

LEON J. YARROW, *Discussant*

Division 19. Military Group Performance

11:00-12:00. Lecture Room, University of California Extension Bldg.

AARON B. NADEL, *Chairman*

11:00. Sociometric choices and group productivity among radar crews. FRANCIS H. PALMER AND THOMAS I. MYERS, *Human Research Unit No. 2, CONARC, Ford Ord, California*.

This study related the amount of social interaction among members of radar crews to group productivity, when productivity was defined as two facets of the crews' normal operational activities. It is a part of a more comprehensive research designed to identify those human factors of antiaircraft batteries which differentiate between good and poor units.

The radar crews of 40 antiaircraft batteries were rated over a three month period for their ability to (a) locate target aircraft with their equipment, and (b) maintain their equipment in operating condition.

Crew members were then asked to identify those three individuals in the entire battery, of which the crew is a part, (a) with whom they most and least liked to associate in off-duty situations, and (b) who they thought most and least valuable to the battery.

Correlations were computed between the amount of sociometric choice among members of the entire crew and among status and nonstatus members, and the criteria. Status members were defined as the three key noncommissioned officers in the group.

Results showed that those crews who performed best on Range of Radar Pickup tended to choose off-duty associates from battery personnel outside of their crew. This was true for both status (.51) and nonstatus (.33) crew members. No significant relationship existed between crew tendencies to choose pass companions from outside the crew and the other criterion, Radar Maintenance (status, .18; nonstatus, .18). However, the less often status personnel chose nonstatus personnel as pass companions, the better the Radar Maintenance (-.33).

When the "most valuable man" variable was considered, the more the battery as a whole chose the status members of the crew, the better was the Radar Maintenance (.38). No other significant relationships existed for this variable.

These results and the results of other studies suggest that the relationship between social interaction and group productivity may be a function of the nature of the task of the group, and that more emphasis upon the kind of task studied should be made in subsequent investigations.

Slides.

11:15. Crew description dimensions and radar crew effectiveness. THOMAS I. MYERS AND FRANCIS H. PALMER, *Human Resources Research Office*.

PURPOSE: The purpose of this study is to provide further information about group dimension variables. Specifically, the research evaluates the Crew Description Questionnaire (CDQ), developed by Hemphill *et al.*, in terms of both its sensitivity and validity by securing indices of certain group parameters and relating these obtained values to an operational effectiveness criterion.

METHOD: The leader and subordinates of thirty-four intact radar crews were separately administered items from four CDQ scales to secure descriptive indices of the structure and interaction within the group. The measures thus obtained were then variously related to a reliable group performance criterion—crew ability to locate target aircraft.

RESULTS: The results showed that: (a) Harmony, Procedural Clarity, Intimacy, and Stratification, as defined by the CDQ, are parameters which significantly differentiate between groups. (b) These factors were uncorrelated in the sample studied, with reference to both leader and crew mean measures. (c) Leader and crew evaluations of the same groups, with respect to Procedural Clarity and Stratification, were significantly correlated; for Harmony and Intimacy, they were not. (d) Crew-derived indices of group dimensions were not related to the criterion performance. (e) Of the four scales only that involv-

ing the leader's rating of Stratification within the group was correlated with crew performance, $r = .44$, and (f) the leader rating—follower rating interaction effects upon performance were not significant.

It was concluded that the four CDQ scales employed were sensitive instruments with respect to several criteria. Although crew scores did not relate to the employed criterion of group effectiveness, the extent of group stratification, as perceived by the leader, was such a correlate. Whether this finding can be attributed to a reflection of stressed military discipline and hierarchy or whether subtler leadership influences are implied is not yet clear.

11:30. Can "expert" observers predict performance of complex man-machine systems? H. W. SINAICO, E. P. BUCKLEY, L. M. CHAUVENTTE, W. W. ERWIN, *Naval Research Laboratory*.

PROBLEM: To establish the efficacy of subjective ratings by experienced naval officers in predicting the performance of complex information processing systems. The specific model considered was the Naval Combat Information Center (CIC).

SUBJECTS: Four qualified naval CIC officers, three experienced petty officers, and 18 radarmen.

PROCEDURE: As part of a larger study involving the full scale mock-up and operation of two conventional and three experimental CICs, 10 objective and three subjective measures of system performance were obtained. The experiment consisted of 96 runs of high density, electronically generated air targets. Crews of enlisted radarmen and petty officers performed all detection, tracking, plotting, and track designation tasks; CIC officer-subjects served as system supervisors, and, in addition, completed rating schedules during and after each run. The present study is an analysis of the relationship between summary (end-of-problem) ratings of officer-subjects and each of ten objective measures of the five systems' performance under several conditions of target density.

RESULTS: Subjectively rated factors of System Stability, Tactical Utility, and Display Appearance nominated as the best system that which actually performed best on eight of the 10 objective criterion measures under heavy target loads. With moderate track densities agreement between opinions and performance was significantly lower: subjective ratings agreed in their selection of a best system with only one of the objective criteria.

CONCLUSIONS: Opinions of operationally experienced participant-observers tend to agree with actual performance of large scale man-machine systems under relatively stressful operating conditions. However, considering a range of stimulus complexity, estimates

by operating personnel are not effective predictors of measured system performance.

In addition to analysis of relationship between mean ratings and system performance, a discussion of the sequential order of subjective ratings and their relationship to system performance will be presented. Slides.

11:45. The effect of the announcement of a knowledge test on questionnaire responses. HERMAN ROEMMICH, *U. S. Naval Personnel Research Field Activity, San Diego.*

PROBLEM: To investigate the effect of the threat of a subject-matter test on questionnaire responses.

This study reports a technique used in an attempt to control the tendency of respondents occupying lower level jobs to report performing tasks which are performed usually by the higher rated workers. PROCEDURES: 81 third-class sonarmen were presented a 70-item task-form questionnaire with instructions for checking each task they performed aboard ship without supervision. These 81 subjects composed the nontest group. Forty-one subjects were presented the same task-form questionnaire but for these subjects the instructions were changed. These 41 subjects, known as the test group, were told that each subject would be given a paper-and-pencil knowledge test covering various tasks performed by sonarmen. The proportions of the 81 nontest subjects and the 41 test subjects who reported performing the tasks were then compared. Chi-square tests were computed for each item.

RESULTS: The proportion of responses between test and nontest subjects on 19 of the 70 items were found to be significantly different at either the 5 or 1 per cent level of confidence. Many of these items were maintenance items which are usually performed by the higher rated sonarmen only.

DISCUSSION: The proportion of test-group "do" responses became significantly smaller on certain maintenance items after the announcement. The interpretation of this finding is that lower level workers tend to report performing tasks on a questionnaire which they do not ordinarily perform and which are performed by only the higher level worker. Upon introducing the threat of a knowledge test, it appears that lower level workers tend to report more nearly just those tasks which they actually performed.

CONCLUSION: The effect of the introduction of an announcement of a subject-matter test to subjects reporting tasks they perform on a task-form questionnaire tends to decrease the number of incidents of reporting performing tasks which are not actually performed.

TUESDAY AFTERNOON, SEPTEMBER 6

International Council of Women Psychologists. Luncheon and Business Meeting

12:00-4:50. Room A, Sheraton Palace

HARRIET E. O'SHEA, Chairman

Participants: PORTIA BELL HUME, Deputy Director of the State Department of Mental Hygiene; MARGARET BARRON LUSZKI, Project Coordinator of the Work Conferences in Mental Health Research.

Films. Childhood and Adolescence

(See listings, Saturday afternoon, September 3)

1:30-5:00. Colonial Room, St. Francis

Division 2. Symposium: Whither Goeth Psychology: The Future of Psychology as I See It

1:30-3:30. Auditorium, U. of C. Extension Bldg.

ROBERT S. HARPER, Chairman

Participants:

JOHN F. DASHIELL. Past, present, and future.
HERMAN M. HARVEY. Anticipation of things to come.

LEONARD CARMICHAEL. The psychology of teaching psychology.

Division 3. Vision I

1:30-2:30. Room 2127, Sheraton Palace

G. HAMILTON MOWBRAY, Chairman

1:30. Rod-cone interaction in the dark-adapted eye.
JOHN L. BROWN, *Aviation Medical Acceleration Laboratory, Naval Air Development Center, Johnsville, Pennsylvania.*

Spectral sensitivity of the dark-adapted eye is usually expressed in terms of the scotopic luminosity curve. Although this curve affords a good description of sensitivity for light detection, it is unlikely to represent sensitivity for such visual functions as recognition of complex forms when these are presented in short flashes to the dark-adapted eye. It was the purpose of this experiment to determine possible changes in the relative contributions of rods and cones to "seeing" by the dark-adapted eye with changes in the criterion of threshold.

Two subjects were used. Luminance thresholds with nine different spectral distributions ranging from deep red to deep blue were determined after dark adaptation. The criterion of threshold consisted in the identification of the orientation of grating test objects. Six different gratings were used representing visual acuity requirements of from 0.04 to 0.60. Test flashes were of 0.02 second duration. From changes

in the relative luminance requirements with different spectral distributions as finer gratings were employed, it was possible to detect changes in the spectral sensitivity curve underlying the threshold function. Increases in the visual acuity requirement of the threshold criterion resulted in relatively lower threshold luminances with red light and relatively higher threshold luminances with blue light. This continued from the lowest visual acuity requirement up to a visual acuity of 0.25. For finer gratings (higher acuities), relative luminance thresholds were independent of spectral character of the test flash.

It was concluded that in the dark-adapted eye there is a gradual increase in the relative contribution of cones to "seeing" as visual acuity requirements of the threshold criterion are increased from very low values up to some intermediate value. For higher levels of visual acuity, threshold is dependent on cone function alone.

Slides.

1:45. The effect of field size and luminance on the binocular summation of suprathreshold stimuli.
L. C. WALKER, *University of Alberta*, AND H. LEIBOWITZ, *University of Wisconsin*.

A suprathreshold stimulus viewed binocularly appears brighter than for monocular observation. The purpose of this experiment is to determine the influence of field size and luminance on the magnitude of this summation effect by means of a binocular matching technique.

The visual field contains two square stimuli, comprising the test and comparison fields, on either side of a small, circular fixation point. The fixation point is viewed binocularly, and the comparison field monocularly. The test and comparison fields are matched for both monocular and binocular observation of the test field. The difference between the two matching values is taken as a measure of binocular summation. The experimental design provided for balancing of order of presentation, field size (15, 30, and 60 minutes of arc), and luminance (300 and 0.3 millilamberts). An analysis of variance was performed on the data from the two experienced subjects.

The results indicated that a higher luminance of the comparison field was required to match the test field for binocular than for monocular observation. The magnitude of the summation effect increased with field size but was not significantly different for the two luminance levels employed. The summation effect is of the same order of magnitude as obtained by Sherrington and others who utilized a flicker technique. It is suggested that field size is one factor which may account for the observed differences in the amount of binocular summation obtained by other in-

vestigators who employed the binocular matching method.

Slides.

2:00. Visual acuity as a function of intensity for different hues. JOHN H. BERBERT, *Sound Division, Naval Research Laboratory*. (Sponsor, Richard M. Michaels)

PROBLEM: To determine the influence of luminous intensity and hue on the resolution of fine detail, where the detail is self-luminous on a dark background.

SUBJECTS: Two adult females and the author, all having normal visual acuity and color vision.

PROCEDURE: Two points of light on a dark background were chosen to represent the fine detail. One of these light points could be made to approach or recede from the other. While fixating the dots, the subject varied the separation until the two dots appeared just touching. When apparently just touching, the dots actually were physically separated by a measurable distance. For each setting this distance was measured and converted to angular subtense at the subject's eyes. This angle was called the minimum separable angle (m.s.a.)

The two dots were matched in intensity and chromaticity. Six dot colors were used, white and five others of high purity having dominant wavelengths near $450\text{m}\mu$, $500\text{m}\mu$, $550\text{m}\mu$, $600\text{m}\mu$, and $650\text{m}\mu$. For each dot color m.s.a. settings were made for a range of intensities, including the minimum intensity at which a setting could be made.

RESULTS: The curves of m.s.a. vs. intensity have the same general shape for all colors used. M.s.a. is a minimum for a mid-range of intensities, whereas for both low and high intensities m.s.a. is relatively large. The effect of hue on m.s.a. is different for the different subjects.

CONCLUSIONS: There is an optimum range of intensities for the resolution of luminous detail on a dark background. Either too low an intensity or one that introduces glare impairs resolution. Further observations are necessary to determine the influence of hue. Slides.

2:15. The luminance threshold for the visual discrimination of movement as a function of the speed and extent of motion. ROBERT H. BROWN, *Naval Research Laboratory, Washington*.

PROBLEM: Several recent experiments have supported the original notion of Exner that motion is perceived directly at optimal intermediate speeds and that it is inferred from observations of changes in position at slow speeds. More specifically, the hypothesis has been proposed that the discrimination of movement at

intermediary speeds involves a single sensory event. The purpose of the present experiment is to test this hypothesis for different extents of motion and over the optimal range of speeds for each extent.

SUBJECTS: Four college students with 20/20 visual acuity.

PROCEDURE: A small spot of white light moved at uniform speed from the center to the periphery of the dark circular fixation area. The subject reported its direction, right or left. The experimenter measured the luminance threshold by the limits for this discrimination. During an experimental session the extent was constant and the luminance threshold was measured over a wide range of speeds. The experimental sessions were counterbalanced with respect to the major variables of extent and speed of motion.

RESULTS: 1. An analysis of variance was conducted to determine the effect of extent, speed, and other variables in the situation upon the threshold.

2. This analysis indicated that extent and speed were the major variables and that their effect was uncontaminated by interaction with other factors.

3. When the threshold luminance was plotted against speed of motion, the luminance was constant up to a critical rate beyond which it increased directly with stimulus speed. Extent of motion operated as a parameter determining the locus of the function.

CONCLUSIONS: When analyzed in terms of the Bunsen-Roscoe law, the results indicated that the visual discrimination of movement under the conditions of the present experiment may be regarded as a single sensory event controlled by the magnitude of initial photochemical activity.

Slides.

Division 3. Transfer of Training

1:30-2:30. English Room, Sheraton Palace

DON LEWIS, Chairman

1:30. A test on transfer of training in weight-discrimination with rats. MADAN SINHA, *University of Oregon*. (Sponsor, Robert Leeper)

The issue in this investigation is: "How" and "when" does generalization occur in weight discrimination?

PROCEDURE: Thirty-nine rats were trained in a single-string apparatus to pull in a rewarded food trough of 50 grams of weight. They were divided into four groups and trained in weight discrimination in a double-string apparatus. The Control Transfer Group was trained to a criterion of mastery in two successive easier discriminations, viz., 270 vs. 50 and 210 vs. 70 grams of weight, and then shifted to the final problem—a discrimination between 170 and 90 grams.

The Reverse Transfer Group had the same training schedules except that in the final problem the cue relations were reversed. The Control Group was trained all through with the final problem. The Reversal Group was given five days pre-reversal training before work with the final problem. Half of the animals of each group were trained with the heavier weight positive, and the other half with lighter weight positive.

RESULTS: The Control Transfer Group was far superior to the other groups. The Control Group came out next. The Reversal Group and the Reverse Transfer Group were third and fourth, respectively, in order of proficiency.

CONCLUSION: In transfer situations the data corroborate Douglas Lawrence's finding that the expectations from the "absolute reaction" theory are inadequate. On the other hand, in the reversal situation, the findings are consistent with "absolute reaction" theory. The findings as a whole seem to favor a "relative reaction" theory, but it seems clear that, if such a theory is to account for all of the findings of the present experiment, it must be developed into a more complex and differentiated interpretation than it has been.

Slides.

1:45. The formation of learning sets by cats. J. M. WARREN AND ALAN BARON, *University of Oregon*.

PURPOSE: These experiments were designed to determine (a) if cats can form discrimination learning sets, and (b) if cats can concurrently form independent sets for solving two different kinds of discrimination problems.

SUBJECT: 12 young, experimentally naive cats. Four cats were studied in Experiment 1, and eight in Experiment 2.

PROCEDURE: The subjects were tested in the Wisconsin General Test Apparatus. Fifty noncorrection trials were presented each testing day in both experiments.

Experiment 1. The subjects were tested on a series of 340 simultaneous discrimination problems. The cats were trained to a criterion of 80 per cent correct responses on Problems 1 to 4. Problems 5 to 80 were presented for 50 trials, Problems 91 to 140 for 25 trials, and Problems 141 to 340, for 10 trials each.

Experiment 2. The subjects were tested alternately on simultaneous and successive discrimination problems. They were trained to the criterion of 80 per cent correct responses on Problems 1 to 4, and then completed a set of 64 simultaneous and 64 successive problems presented for 50 trials each.

RESULTS:

Experiment 1. Over the series of 340 problems, the group's performance on Trials 2 to 10 improved from 50 to 70 per cent correct responses. Little consistent improvement was noted over the last 200 problems.

Experiment 2. The percentage of correct responses on the simultaneous problems increased from 70 to 82 from the first to the fourth quarter of the experiment. Performance on the successive problems improved from 58 to 70 per cent correct responses. Interproblem learning and the difference between performance on the successive and simultaneous problems are significant at the .001 level of confidence.

CONCLUSIONS:

1. Cats form learning sets.
2. Learning-set formation by cats proceeds at a much slower rate and terminates at a much lower level than set formation in monkeys.

Slides.

2:00. Three studies of successive and simultaneous discrimination learning in the cat. ALAN BARON, J. M. WARREN, AND L. J. NIDORF, *University of Oregon.*

PROBLEM: Three experiments were performed to investigate the relative difficulty of simultaneous and successive discrimination problems for experimentally naive and sophisticated cats.

PROCEDURE: 24 cats were trained in the Wisconsin Apparatus with kidney as the incentive. Food and water were always available in the living quarters.

The stimuli were pairs of wooden blocks differing in form, brightness, thickness, and surface area, each new problem presenting a unique combination of these elements. Two dissimilar objects were presented on every trial of the simultaneous problems, one being consistently rewarded independent of spatial position. On a given trial of the successive problems, one of two different sets of identical pairs was presented and on successive trials the right member of one pair and the left member of the other pair were rewarded. Fifty noncorrection trials were given per day until criterion, 20/25 correct responses, was reached.

In Experiment I, eight cats were trained on four successive problems, and four cats on four simultaneous problems. In Experiment II, each of eight cats was initially trained on two successive and two simultaneous problems and again tested with two successive and two simultaneous problems after extensive learning-set training. The four cats studied in Experiment III mastered eight successive and eight simultaneous discriminations.

RESULTS: The results of all three experiments indicate that, although considerable interproblem transfer occurs on both types of discrimination, learning

of successive problems remains three to four times as difficult (as measured by errors to criterion) as learning simultaneous problems, even over a series of 16 problems. This difference (e.g., 129 vs. 35 errors for Group II) was significant at the .01 level of confidence in all groups. However, Group II which was given learning set training on both types of problems made fewer errors learning successive problems after the completion of this training (12.5 vs. 12.8 errors).

Slides.

2:15. Interrelationships of successive and simultaneous discrimination. ALVIN J. NORTH, *Southern Methodist University*, AND MALCOLM JEEVES, *Cambridge University.*

PROBLEM: (a) To determine the direction and amount of transfer from simultaneous to successive discrimination, and conversely. (b) To determine whether simultaneous and successive discrimination habits, having been learned successively, can exist concurrently.

SUBJECTS: 32 albino rats.

METHOD: The apparatus was a four-unit linear maze. Thirty-two rats were divided at random into two groups. Group I first learned a simultaneous black-white discrimination and then a successive black-white discrimination. Group II learned the two tasks in the opposite order, successive first and simultaneous second. In each group, one half learned the first task to a criterion level, and the other half overlearned. After retraining on the first task, the simultaneous configurations (black-white and white-black) and the successive ones (black-black and white-white) were presented in restricted random order.

RESULTS: (a) Simultaneous discrimination was learned with fewer errors than was successive. (b) There was positive transfer from simultaneous to successive discrimination, the amount increasing with overlearning of the first task. (c) There was negative transfer from successive to simultaneous discrimination, the amount being (unreliably) less with overlearning of the first task. (d) When the simultaneous and successive stimuli were presented in random order, few errors occurred, thus demonstrating retention of both sets of habits.

CONCLUSIONS: 1. The results on transfer either support or may be reconciled with the hypothesis of "acquired distinctiveness of cues."

2. Theoretical analysis shows that concurrent retention of successive and simultaneous habits is incompatible with the view that approach and avoidance responses are established only to stimulus elements (colors).

3. In order to account for "noninterference between successive and simultaneous habits," the following

hypothesis is offered: *A stimulus complex may function as a stimulus unit for evoking an approach or avoidance response to one of its elements.*

Division 5 and Psychometric Society. Scores and Norms

1:30-2:30. Comstock Room, Sheraton Palace

JOHN T. DAILEY, Chairman

1:30. The most reliable composite score. FREDERIC M. LORD, *Educational Testing Service*, AND MAX A. WOODBURY, *George Washington University*.

Simple formulas have recently been derived by the junior author for weighting the tests in a battery and allocating the administration time so as to maximize the reliability of the weighted battery composite, the true score of the composite being specified in advance.

Although it would be more desirable in many cases to maximize the validity of the composite rather than the reliability, formulas presently available in the literature for maximizing the validity may lead to a solution involving negative administration times for certain tests, in which case the practical worker may have considerable difficulty finding the optimum solution to his problem. This type of difficulty is overcome in the solution to the present problem.

The formulas presented show the somewhat remarkable result that, except for sign, the weight assigned to any test in the optimum composite is determined solely by the standard error of measurement of that test at unit time. In fact, the optimum weight for each test is simply the reciprocal of the standard error of measurement of the test at unit testing time with the proper sign attached.

Thus, the optimum weight can be incorporated once and for all into the scaled score of each of a set of tests with the assurance that irrespective of the composition of the battery selected from among these tests, these scaled scores will always be the ones that maximize the correlation between the unweighted battery composite and its true score. Any unweighted sum of the scaled scores on any set of tests scaled in this fashion will always be more reliable than any weighted sum having the same true score.

An illustrative numerical example is given.

1:50. Follow-up norms for predictive tests. JOHN C. FLANAGAN, *American Institute for Research*.

The greatest source of error in using test scores is not the errors of measurement in the test scores but the errors of interpretation and prediction arising from using the usual types of norms and methods of combining results. Norms which describe the performance of national, regional, or local groups representative of these populations are frequently recommended as an aid to test interpretation. Perhaps the next most frequent type of normative data are de-

scriptive of the scores made by persons who are currently in the specialized groups for which the predictions are being made. Examples of such norms are those for occupational groups such as machinists, or for diagnostic categories such as neurotics.

Use of such norms to interpret the scores of individuals or groups leads to errors since several assumptions must be made. First it must be assumed that the backgrounds and opportunities for experiences of the types reflected in the predictive test contents are closely similar for the normative reference groups and the individual or group whose scores are being interpreted. Second, testing conditions in terms of motivation, set, and related factors must be assumed to be approximately the same for the current and comparison groups.

It is proposed that errors of interpretation can be greatly decreased by using follow-up norms to interpret predictive scores. An example of the use of this approach will be reported. In this study an attempt was made to follow up about 1,600 persons who had taken a battery of aptitude classification tests during their senior year in high school. One year after graduation 1,300 of these individuals reported on their success and satisfaction in jobs or training courses entered after leaving high school.

Examples of the combined scores and norms for satisfied and successful groups obtained in this way will be presented.

2:10. Relationships of school, parent, and community characteristics to performance on aptitude and achievement tests. WILLIAM G. MOLLENKOPF AND S. DONALD MELVILLE, *Educational Testing Service*.

The purpose of this study was to determine what characteristics of public secondary schools were most closely related to the performance of their students on academic aptitude and achievement tests.

The subjects were 9,600 ninth grade students in 100 schools and 8,357 twelfth grade students in 106 schools.

A 25-item questionnaire was sent to over 1,800 high school principals to secure information regarding school facilities, staff, and support; education and occupation of parents; and characteristics of the community, such as its size and rate of growth. By the time analysis began, 844 usable replies had been received. From the questionnaire items, 32 variables were obtained. Interrelationships of these for each of four groups of schools classified according to size were computed and then subjected to a principal components factor analysis.

Results of these analyses were used to select schools in which tests were given. Treating each school as

a single case (by using the average score on a test as the "school's" score), the test score means were then related to the community-parent-school variables.

Items found to relate substantially to the aptitude scores included instructional support per pupil, percentage of support from local effort, presence or absence of a community library, and whether the community was urban or rural. It seems best to regard these relationships as evidences of concomitant variation only.

As was expected, the academic aptitude of the students predicted the achievement test means considerably better (.90) than did a best-weighted composite of school, parent, and community characteristics (.59). Yet some characteristics did add to the effectiveness of this prediction. Among these were the percentage of graduates going on to college, the size of the average instructional class, and the presence or absence of a community library.

Divisions 7 and 15. Symposium: Ongoing Research Related to Children

1:30-3:30. Borgia Room, St. Francis

NANCY BAYLEY, Chairman

Participants:

WILLIAM E. MARTIN. Report on inquiry into current research in developmental psychology.

RALPH L. WITHERSPOON. Establishing cooperative research.

RICHARD A. LITTMAN. Research on learning in normal households.

URIE BRONFENBRENNER. Research on social development.

WAYNE H. HOLTZMAN. The cooperative youth study.

Divisions 13 and 14. Symposium: Human Engineering: Industrial Case Studies

1:30-3:30. Empire Room, Sir Francis Drake

JEROME H. ELY, Chairman

Participants:

STANLEY N. ROSCOE, ROBERT B. SLEIGHT, AND JOSEPH W. WISSEL.

Division 19. Adjustment to Military Service

1:30-2:30. Lecture Room, University of California Extension Bldg.

NEIL D. WARREN, Chairman

1:30. The relationship between psychogalvanic activity and pilot performance under simulated instrument flying conditions. THOMAS A. HUSSMAN, JR., *Naval Medical Research Institute, Bethesda*, and RAY C. HACKMAN, *University of Maryland*.

This paper reports the results of an experimental investigation of the relationship between skilled performance and the emotional activity which precedes, accompanies, or follows it as measured by the galvanic skin response (GSR). The performance of 12 Navy pilots was measured as each flew eighteen 12-minute precision maneuvers under simulated instrument conditions. Alternate trials were performed without the use of the attitude instruments to test the effect of this reduction in information on performance and GSR. A time-sampling system of recording the deviations of the plane's instruments from their expected readings and continuous recordings of the pilot's skin resistance yielded the basic measures of the two variables. A correlation analysis designed to relate anticipatory, concurrent, and delayed emotional responses to performance during 30-second time samples was performed both within individuals and treating the individuals as a group with the following results:

A low positive correlation was found between performance and mean GSR activity in this group of pilots while under the normal full-instrument condition. The correlation was essentially zero under the partial panel condition.

When compared to the full panel condition, the partial panel condition produced significantly poorer performance and significantly greater GSR activity.

GSR activity was shown to be significantly greater before and after each maneuver than during the maneuver period.

Significant inter- and intraindividual differences were found in the relationship of GSR to performance. A majority of the subjects showed anticipatory emotional activity related to their task performance. Both consistently positive and consistently negative correlations were found in some individuals indicating that emotional activity may be either facilitative or disruptive to pilot performance.

Slides.

1:45. Prediction of adjustment with an "objective group frustration" test. JOHN R. BARRY, *Western Psychiatric Institute, University of Pittsburgh*, SAMUEL FULKERSON, AND SAUL B. SELLS, *USAF School of Aviation Medicine, Randolph Field*.

PROBLEM: To study frustration reactions to the McKinney Reporting Test and to determine their usefulness for the prediction of subsequent adjustment to flying training.

PROCEDURE: The McKinney Test, the SRA Primary Mental Abilities (PMA), and other potential selection tests were administered to 328 copilots during their first week of the B-29 Combat Crew Training

Program. None were excluded from training because of their test responses. Ratings of over-all adjustment to the training program were made at the end of training by psychologists using objective data, group ratings, and interviews. The subjects were divided into two groups, matched on ratings of adjustment. The 50 best and 50 poorest subjects in terms of the criterion ratings of adjustment were selected from each group for the two samples.

FINDINGS AND CONCLUSIONS: The hypothesis that the McKinney Test measures reactions to frustration was studied by intercorrelating each individual's test responses to the different parts of the test. In general, members of the upper criterion group had higher intercorrelations (i.e., were less frustrated) than the members of the lower criterion group. This finding will be contrasted with that of Douglas and Brown.

Performance efficiency (or test reactions to frustration) was significantly correlated ($p < .01$) with future adjustment to training. Predictions of future adjustment were correct for 63 per cent of the Validation Sample.

The relationships of test efficiency (or frustration reactions) to age, to intellectual ability (as measured by PMA subtest scores), and to previous flying experience (hours) were studied. No significant correlations were found between frustration reactions and (a) age, or (b) previous flying hours. However, significant correlations between PMA subtest scores and (a) McKinney scores and (b) criterion status were found. When PMA scores were partialled out of the relationship between the McKinney scores (the predictor) and the criterion, that relationship remained statistically significant ($p < .01$). Thus the test appears to measure frustration reactions to a significant degree, as well as ability factors.

This research was completed at the USAF School of Aviation Medicine.

Slides.

2:00. Development of a covert test for the detection of alcohol addiction by a keying of the Kuder Preference Record. RONALD C. FORCE AND PAUL L. THOMAS, 3320 Retraining Group, and Training Analysis and Development Division, Amarillo AFB.

PROBLEM: On follow-up of military prisoners restored to duty following retraining, it was found that among those addicted to alcohol were a high percentage of military offense recidivists. Manson's Alcadd test, Hampton's keying of the MMPI for alcohol addiction, plus this keying of the Kuder Preference Record aids in the screening for detection, categorization, and prediction of outcome of alcoholics.

SUBJECTS: 34 young, male, military prisoner, diagnosed alcoholics were contrasted with 34 consecutive patients otherwise similar but not so diagnosed and with no social history of excessive use of alcohol.

PROCEDURE: Standard item validity procedure was employed on the 1,008 items of the Kuder Preference Record, form CH-Vocational answer pads. Also, empathic judges were asked to describe the personality differences between the two groups from an examination of the interest items chosen.

RESULTS: There were 179 items which predicted at the one per cent level of confidence. These items, when scaled, help separate not only the criterion groups but subsequent, independently located alcoholics from those who do not have this problem. Clusters of contrasting personality characteristics emerge, which may add to the understanding of the dynamics of alcoholism.

2:15. Brief psychotherapy and enuresis. DANIEL H. HARRIS, RICHARD W. FIRESTONE, AND CARL M. WAGNER, U. S. Marine Corps Recruit Depot, San Diego.

PROBLEMS: Entering upon any new and demanding life situation entails emotional stress and arouses anxiety. The use of appropriate brief psychotherapy at the inception of such situations should facilitate adjustment. The specific hypothesis here investigated was: The adjustment to boot training of recruits with an enuretic history can be demonstrably improved by a brief psychotherapeutic procedure during the regular psychiatric screening interview.

SUBJECTS, PROCEDURE: 200 recruits entering training with any admitted history of enuresis during the previous five years were randomly assigned to experimental ($N = 100$) and control ($N = 100$) groups. The two groups did not differ significantly in age, education, intelligence, or degree of apparent NP involvement. Inserted into the regular psychiatric screening interview for the experimental subjects was a brief psychotherapeutic procedure designed to relieve their anxiety related to enuresis by means of a permissive and reassuring discussion of the symptom plus a focusing of positive motivation around some plausible behavioral suggestions for overcoming the habit. Those in the control group had only the regular psychiatric screening interview. Any subsequent contacts with subjects in either group followed a standardized pattern in which further attempt at therapy was avoided.

RESULTS, CONCLUSIONS: Eight experimental and 20 control subjects received "Inaptitude" discharges before completing recruit training. This difference is significant at better than the .02 level of confidence.

The inaptitude discharge rate of a third group of recruits who had denied enuretic history at screening but later proved enuretic was significantly higher than for either experimental or control group, at better than the .01 level. Some theoretical aspects of the study pertaining to personality dynamics are discussed, and areas for further research and for wider application of the procedure used are suggested.

Division 3. Human Engineering

2:40-3:40. Room 2127, Sheraton Palace

BERT F. GREEN, Chairman

2:40. The persistence of visual search. HERBERT M. JENKINS AND J. E. KEITH SMITH, *Massachusetts Institute of Technology*.

PROBLEM: Recent experiments show that performance in detecting targets declines in the course of a long watch. Withholding knowledge of results and making targets infrequent increase the extent of the decline. This experiment extends these findings by exploring the effects of target frequency and knowledge of results upon the persistence of search in repeated trials.

SUBJECTS: 40 enlisted men of the USAF.

METHOD: The display consisted of over 3,000 regularly spaced small holes in an area of 2 sq. ft. The target was a patch of gray paper placed behind one of these holes. On each trial the subject searched until he had either detected a target or decided that no target was present. Persistence was measured by the time spent in search before reporting "no target." A watch lasted for two hours or a maximum of 40 trials. Each subject served two watches on different days.

Four conditions were formed from two target frequencies used with or without knowledge of results. Subjects assigned to the lower target frequency were told that the probability of a target on a trial was .01. Actually, no targets were presented during their watches. Subjects assigned to the higher target frequency were told to expect and actually received targets on ten per cent of their trials. Subjects receiving knowledge of results were told whether or not their reports were correct after each trial.

RESULTS AND CONCLUSIONS: (a) In all groups the persistence of search eventually declined from an initial level of approximately 200 sec. to an asymptotic level of approximately 90 sec. (b) When knowledge of results was withheld, there was an initial increase in persistence on successive trials. The extent of this increase was much greater for the higher than for the lower target frequency.

The research reported in this abstract was supported by the Lincoln Laboratories under joint con-

tract with the Department of the Air Force, the Department of the Navy, and the Department of the Army under Air Force Contract No. AF 19 (122)-458.

Slides.

2:55. Psychophysical evaluation of a new quantitative and check-reading dial design principle.

MARTIN I. KURKE, *U. S. Army Ordnance, Human Engineering Laboratory, Aberdeen Proving Ground*.

Reading speed and error probability of an instrument dial design embodying a new display principle were investigated using a variation of the card-sorting technique. Three dial designs were compared: the experimental quantitative dial which flags a red signal when dangerous (or unsafe) operation is indicated; a conventional quantitative dial "red-lined" to indicate "danger" areas of operation; and a control quantitative dial containing no warning device at all. Each display was represented by a deck containing 30 cards indicating safe, and 20 cards indicating unsafe operation. Each deck was sorted into "safe" and "unsafe" piles by 33 male subjects in balanced order to eliminate practice effects. A fourth deck to determine brightness discrimination time plus motor (card sorting) time was used for the first, second and sixth trials. The mean of the subject's second and sixth trials represented a base motor time for each individual which was subtracted from his unadjusted time scores on the sorting of each of the test decks (Trials three, four, and five) to yield decision time for each of the three test decks.

For all 1,650 decisions per deck there occurred 39, 18, and 1 errors for the unmarked, red-lined and experimental displays, respectively. Mean unadjusted time scores for these 50-card decks were 73.1 sec. ($SD = 13.0$), 69.6 sec. ($SD = 14.9$), and 52.9 sec. ($SD = 10.3$); while adjusted scores were 27.75 sec. ($SD = 10.02$), 20.50 sec. ($SD = 9.82$), and 4.25 sec. ($SD = 4.87$), respectively. All time scores were significantly different beyond the one per cent level except the unadjusted scores between the two control dials.

This study demonstrates the superiority of the experimental dial design over the conventional quantitative display, whether or not the latter is red-lined. It is suggested that the advantage of the experimental display results from its simpler visual discrimination requirement for check reading.

Slides.

3:10. Some variables affecting prehension force.

JOHN LYMAN, *University of California, Los Angeles*.

PURPOSE: To observe prehension force during the manipulation of a cylindrical object as a function of the mass of the object, the distance and direction in which the object was moved, and the degree to which tactual sensory cues were distorted.

SUBJECTS: Six male undergraduate engineering students.

EXPERIMENTAL DESIGN: A treatment by subjects factorial design with five masses, three distances, seven directions, and three conditions of handcovering as independent variables.

ROUTINE: Each subject was required to pick up a 1½-inch diameter cylinder from a standard position and place it in various locating holes on command from the experimenter. Commands consisted of an alphanumeric code designating the location and were given verbally from a program in which the order of presentation was random. Prehension force was measured by means of a sensitive transducer mounted in the cylinder and was recorded on an oscillograph.

RESULTS: The variables of mass, distance, and condition of sensory distortion were statistically significant while the variable of direction was not. There was significant interaction between mass and sensory distortion.

Slides.

3:25. Analysis of performance on the Multipoint Two-Hand Coordinator. JOAN H. CANTOR, *George Peabody College for Teachers*, DON LEWIS, AND DOROTHY E. McALLISTER, *State University of Iowa*.

PROBLEM: To determine the chief features of performance on four different tasks on the Multipoint Two-Hand Coordinator.

APPARATUS: The Multipoint Two-Hand Coordinator differs from the usual two-hand unit in that it utilizes a stationary hard rubber disk and an irregular pattern of small circular brass buttons instead of a moving disk and moving target. The buttons, 1/8 inch in diameter, constitute a series of small targets to be contacted with the target follower. The subject turns two lathe-like handles to move the target follower and strives to contact (hit) as many buttons as possible during each trial period. The four tasks were obtained by changing the direction in which the buttons were to be contacted and by reversing the required directions of turning the handles.

SUBJECTS: 74 undergraduate male students.

PROCEDURE: Practice occurred during four periods, each about 50 minutes in length, on four successive days. Twenty original learning and 20 relearning trials were given on each task. The trials were 30 sec. in length, with intertrial pauses of 30 sec. The tasks were learned and relearned in the same order.

RESULTS: Performance curves, based on mean number of hits per trial, showed that the two tasks requiring "unexpected" directions of turning the handles were much more difficult than those requiring "expected" directions of turning. Positive and negative transfer were found. Losses in proficiency at the points of shift in task were large. Losses over the three 24-hour breaks in practice were significant. Intercorrelations among number of hits on 16 selected trials were used in a factorial analysis. Three factors were obtained: (a) one associated with the two tasks requiring expected directions of turning, (b) one with the two requiring unexpected directions of turning, and (c) one with performance immediately after shifting from one task to another.

Slides.

Division 3. Physiological Psychology II

2:40-3:40. English Room, Sheraton Palace

PAUL E. FIELDS, Chairman

2:40. The summation of muscle tensions due to stress. SHERWIN J. KLEIN, *Aeronautical Medical Equipment Laboratory, Philadelphia Naval Base*.

OBJECTIVE: To determine the combined effects of tension-inducing and tension-reducing agents on the muscle action potentials (MAP) during ergographic work. The tension-inducing stressor agents used were muscular exercise in a finger ergographic task and experimentally induced failure. The tension-reducing agent used was experimentally induced success.

SUBJECTS: 18 male adults.

PROCEDURE: In an initial work task all subjects continuously lifted the ergographic weight until exhausted. This served as a base level from which comparisons could be made. The subjects were then ego involved, half being told they had succeeded and half that they had failed in the initial work. After resting for six minutes the work was repeated. MAP, measured in microvolts, were recorded throughout the procedure.

RESULTS: Subjects who failed manifested significantly higher MAP than did the successes during the rest period following ego involvement. MAP for failures were significantly higher in repeated work than in initial work. MAP for successes were significantly lower in repeated work than in initial work. MAP in the repeated work following failure was significantly greater than the sum of the MAP manifested during initial work and during rest. MAP in the repeated work following success was significantly lower than the difference between MAP during initial work and during rest.

CONCLUSIONS: Experimentally induced failure and muscular exercise as stressor agents combine to pro-

duce a "supermaximal tension" greater than that produced by muscular exercise alone. Experimentally induced success and muscular exercise combine to produce a "subminimal tension" less than that produced by muscular exercise alone. These findings have implications for Selye's general-adaptation syndrome, and for the effect of stress on precision in motor work. Slides.

2:55. Initial results with the magnetometer method of recording stomach motility. M. A. WENGER, B. T. ENGEL, AND THEODORE L. CLEMENS, *University of California, Los Angeles*.

This is the first report from a extensive study of ANS response patterns. It presents the initial results obtained with a new method of recording stomach motility without balloons or other contact pick-up.

The data represent 50 human male subjects in 104 experimental situations plus observations on controlled manipulations of the detectable element.

The subject swallows a small (13×4 mm.) plastic-coated magnetic rod, the movements of which are remotely detected by a Waugh Magnetometer, then amplified and recorded with Offner EEG apparatus. The weight of the magnet ($2\frac{1}{2}$ gm.) seems to retard its passage from the stomach, and continuous records for two hours have been obtained. Validation has involved simultaneous balloon recording, and comparisons of wave forms and periods with those obtained using balloons.

Both simultaneous recordings and wave comparisons show the magnetometer method to be valid, but more sensitive, as compared to traditional balloon techniques. Type I waves, with periods of 8 to 26 sec. predominate; Type II waves, with periods of 47 to 82 sec. occur frequently; Type III waves, with longer periods, are occasional. Both spasm and inhibition may be detected. Both heart- and respiration-induced movements are recordable.

Situations and typical results include: startle, or fear—brief spasm, then irregularity; smoking—partial or total blocking (i.e., spasm or inhibition) followed by depression; eating—depression, with irregularity for varying periods; 3-sec. electric shock—some blocking, then increase in contraction rate; 20-sec. noise—some blocking, then decrease in contraction rate. No typical response was found during four so-called stressors (mental arithmetic, word association, cold pressor test, and hyperventilation), although in 20 of 45 measurable observations slight increases in contraction rate occurred. No change in motility, or some form of blocking, were observed with about equal frequency.

Implications for ANS theory will be discussed. Slides.

3:10. The relationship between anxiety, hypnotically induced emotions, and gastric secretion. JACK TRACKTIR AND DANIEL E. SHEER, *University of Houston*.

PROBLEM: The present study was a test of Cannon's hypothesis that the emotions of anger and fear are undifferentiated physiological states and as applied to gastric secretion are inhibitory in effect.

POPULATION: 24 male subjects were subdivided into three anxiety groups, high, middle, and low, on Taylor's Manifest Anxiety Scale. The total group was subjected to six experimental conditions: pre-hypnotic, hypnotic, posthypnotic, and hypnotically induced states of fear, anger, and contentment.

PROCEDURE: By gastric intubation, specimens of fasting gastric secretion were obtained from each subject at fifteen-minute intervals during a ninety-minute period for each experimental condition. Measures of gastric secretion included free acid, total acid, volume, pepsin, bile, and consistency.

RESULTS: Reliability of differences were tested using an analysis of variance design with ranked data. Some of the results obtained were:

1. A significant interaction between anxiety groups and fear and anger conditions on the free and total acid measures. The high anxiety group was higher under fear as compared with anger. The low anxiety group was higher under anger as compared with fear.

2. A significant interaction between anxiety groups and fear and contentment conditions on the free and total acid measures. The curves of secretion for the high anxiety group under fear and the high and low anxiety groups under contentment were at the same level. These three curves were markedly higher than the one for the low anxiety group under fear.

3. The contentment condition differed from the fear condition in terms of a marked drop in free and total acid for the high anxiety group during the last thirty minutes of the fear session, and the high level of pepsin under contentment as compared with that under fear.

CONCLUSIONS: Cannon's hypothesis is not tenable in so far as gastric secretion is concerned. Fear and anger may be facilitative as well as inhibitory depending upon the anxiety level of the subjects. Slides.

3:25. Autonomic response patterns related to the Funkenstein test. THEODORE L. CLEMENS, *University of California at Los Angeles*.

As part of a larger investigation autonomic response patterns were studied after stimulation with mecholyl chloride. Forty-six male patients with malignant neoplasm served as subjects. They were

given a series of autonomic measures including blood pressure, skin and sublingual temperatures, heart period, salivary output, and pH, pupillary diameter, respiration period, and palmar skin conductance, during a resting state, and after subcutaneous injection with 5 mg. of mecholyl chloride. All but the last two variables are included in this report.

The group responded to mecholyl with decreases in systolic and diastolic blood pressures, finger, forehead, hand and sublingual temperatures; and increases in heart rate, salivary output, and pH. Resting measures of blood pressure, heart period, and hand temperature were significantly correlated with magnitude of response to mecholyl.

The subjects were divided according to Funkenstein's method into those who exhibited an overcompensatory secondary rise in systolic blood pressure (Group I, $N = 19$) and those who did not (Group II, $N = 27$). It was found that these groups were significantly different on every other circulatory variable, i.e., diastolic blood pressure, pulse pressure, heart rate, and skin temperatures, suggesting that a generalized overcompensatory homeostatic mechanism was operative in Group I. Moreover, the direction of the differences suggests that a Group I systolic blood pressure curve is actually indicative of hyperactivity of the sympathetic nervous system at least in its circulatory functions.

It is concluded that autonomic response to mecholyl can be predicted in part from resting measures, but that these measures do not indicate whether or not a given individual will exhibit an overcompensatory response pattern. The results are interpreted as lending support to the contention that the Funkenstein method of classifying autonomic reactions is significant in understanding the psychophysiological organization of the individual.

Slides.

Division 5 and Psychometric Society. Factor Analysis of Mental Abilities

2:40-3:40. Comstock Room, Sheraton Palace

QUINN McNEMAR, Chairman

2:40. Dimension of verbal fluency. P. R. CHRISTENSEN, J. P. GUILFORD, AND N. W. KETTNER, *University of Southern California*.

This is a report on four dimensions of verbal fluency as indicated by several factor-analytic studies on the abilities of high-level personnel. In addition some preliminary results bearing on hypothesized differences between fluency factors will be presented.

A single fluency factor, identified as ideational fluency, was found in two analyses, the analysis of

evaluative abilities and the analysis of planning abilities.

Three fluency factors were found in two studies, the study of creative thinking and the study relating thinking factors to training criteria in the U. S. Coast Guard Academy. In both studies ideational fluency and associational fluency were identified. The third fluency factor in the creativity study was word fluency, in the Coast Guard study it was expressional fluency.

In a recent investigation of various measures of creative traits conducted jointly with the Institute for Personality Assessment and Research at Berkeley, all four fluency factors mentioned above were identified in a single analysis. Tests related to ideational fluency in that study include scores from the Rorschach test and the TAT, in addition to other tests requiring the giving of a number of ideas in a situation in which there is relatively little restriction. The factor identified as expressional fluency was quite strongly represented by scores emphasizing the quality of responses produced. Factors tentatively identified as word fluency and associational fluency were not altogether consistent with previous hypotheses regarding the nature of these factors.

Because of persistent problems of definition in an area that has been frequently factor analyzed, a somewhat new and more systematic approach is being attempted in order to support some and eliminate other notions advanced as to the essential nature of the various obtained fluency factors. Results of some of the preliminary efforts to eliminate from the study less promising hypotheses will be presented.

3:00. Preliminary identification of some factors in the Davis-Eells Games. JOHN CAFFREY AND THOMAS WOOD SMITH, *Division of Research and Guidance, Los Angeles County Schools*.

PURPOSE: What contributions do the results of factorial methods make to an understanding of the factors which account for the intercorrelations among subtests of the Davis-Eells Games, the Language and Non-Language scores of the California Test of Mental Maturity, the three California Achievement Test subscores, an experimental auding (comprehension of spoken language) test, and Warner socio-occupational ratings?

PROCEDURES: Intercorrelations among 15 tests, given to 302 fifth-grade children, were analyzed by centroid and related factorial methods.

FINDINGS: Earlier studies suggest that the ability to comprehend spoken language (auding) and the ability to comprehend written language (reading) are correlated, but, not by any means, identical factors. In

the present study, four factors seem to account for the intercorrelations among 15 scores: four subtests of the Davis-Eells Games, the Language and Non-Language sections of the California Test of Mental Maturity, the five subtests of the Gates Primary Reading Tests (presented as an auding test), and Warner ratings of parental occupations. The four factors are tentatively identified as Visual-Verbal, Auditory-Verbal, Problem-Solving, and Pictorial-Perception. Results of rotation, oblique analysis, and related studies are summarized in tabular and graphic form.

CONCLUSIONS: Four factors appear to be identifiable in the Davis-Eells Games. Apparently problem-solving ability, as specified by Davis-Eells, is a variable which involves auding ability and a visual perception factor, both of which may be sources of the "cultural" bias which persists in the Davis-Eells Games. These findings, though inconclusive, have implications for psychometric methodology. Further studies of the perceptual correlates of auding ability are needed.

3:20. A factor-analytic study across the domains of reasoning, creativity, and evaluation. N. W. KETTNER, J. P. GUILFORD, AND P. R. CHRISTENSEN, *University of Southern California*.

PROBLEM: This study is designed to test and extend the findings of the previous factor-analytic studies in the areas of reasoning, creative thinking, and evaluation.

Three of the major objectives are (a) verification of the factors, (b) clarification of the nature of the factors, and (c) derivation of information leading to the improvement of tests measuring the factors.

Eleven factors from the three previous studies were selected for further investigation: eduction of perceptual relations; eduction of conceptual relations; eduction of conceptual patterns; eduction of correlates; symbol manipulation, sensitivity to problems, associational fluency, originality, redefinition, facility with verbal relations, and verbal classification. In addition, verbalizing ability was hypothesized as a new factor (or group of factors).

PROCEDURE: In order to accomplish the objectives, alternate hypotheses were formulated for most of the factors. Fifty-two tests were selected, adapted, or constructed in order to test these hypotheses. Ten additional reference tests were added to help define other factors.

The battery of 62 tests had to be broken down into three smaller overlapping batteries owing to lack of testing time. Each battery was administered to approximately 200 air cadets. Three factor analyses were undertaken using Thurstone's centroid method

of extraction and Zimmerman's orthogonal method of rotation.

RESULTS AND CONCLUSIONS: Twenty-one distinct factors were identified. Nine of the 11 factors were found in substantially the same form as before with some clarification of their nature. One factor, symbol manipulation, appears to have split into two factors. The remaining factor, facility with verbal relations, did not reappear. Two new factors were found in the verbal area—concept formation and verbalizing ability. Three other factors were found whose tests were scattered among hypotheses under several different factors. They are tentatively called penetration, perceptual classification, and eduction of structural relations. The remaining five factors were reference factors.

Division 19. Prediction Studies Involving Flying Personnel

2:40-4:40. Lecture Room, University of California Extension Bldg.

ROGER BROWN LOUCKS, Chairman

2:40. Training performance and aircraft accidents. WILSE B. WEBB, *U. S. Naval School of Aviation Medicine*.

Given the problem of predicting the accidents of individuals, performance measures during training are reasonable candidates for the job. They should be strong contenders in an expensive military program where critical measures of proficiency during training are well recorded. A test has been performed of the efficacy of several such training measures in predicting aircraft accidents.

The subjects were naval air trainees. The training measures extracted from their 18-month training program were accidents, flight grades, and over-all grades. The over-all grades included ground-school grades and officer-like-quality ratings. The accidents to be predicted were those accidents occurring in jet aircraft within the first 300 hours of flying subsequent to graduation from training. Care was taken to control the factors of time and type of training and subsequent accident exposure.

It was found that training accidents did not predict subsequent accidents. Further, the proficiency measures of training performance were not predictive of accidents.

The data indicate that prediction of military aircraft accidents from highly relevant individual measures of training performance has limited potential. The implication of these data for the concept of accident proneness and accident reduction will be noted. Slides.

2:55. Combat performance: measurement and prediction. DAVID K. TRITES AND SAUL B. SELLS, *USAF School of Aviation Medicine, Randolph Field.*

PROBLEM: Research was undertaken to answer three questions: (a) Are ratings of combat performance and adjustment by peers, superiors, and psychologists related to objective data? (b) Are peer-superior ratings related to psychologist ratings when the psychologist bases his ratings, in part, upon information obtained from peers and superiors? (c) Are combat criteria predictable by precombat criteria of performance and adjustment?

SUBJECTS: 65 AF pilots, having relatively complete training level data, were selected from a larger group who had been evaluated in the Korean theater of operations.

PROCEDURE: Combat and training criteria were divided into three types: objective data, peer-superior ratings, and psychologist ratings. Intercorrelations were computed between all combat criteria but not between training level criteria, which were correlated only with combat criteria. Because of missing data, all correlations were based on varying N 's. To insure some stability of correlation, variables having a majority of N 's less than 30 were omitted.

RESULTS AND CONCLUSIONS: In addition to affirmatively answering the original questions, the results produced some significant insights into the structure of combat criteria. Extensive overseas (noncombat) flying hours are negatively associated with peer-superior ratings of competence and fairness, whereas combat flying hours have no correlation with competence ratings but are positively associated with ratings of fairness and courage. As evaluated by psychologists, deviant behavior in the combat theater is negatively correlated with exposure to combat. These findings suggest that maladjusted pilots are assigned less hazardous duties. Among training level variables, ratings by a single psychologist using tests and interviews have only the smallest number of significant relationships with combat criteria. However, a clinical rating by a psychologist combining objective data and ratings was a good predictor of combat criteria. Finally, it was found that peer ratings made during training are significantly related to peer-superior ratings of likeability and psychologist ratings of deviant behavior made during combat. This was interpreted as demonstrating continuity of certain personality characteristics.

3:10. The interpretation and predictive validity of training-level criteria for the performance of Air Force flying duties. ALBERT L. KUBALA, *School of Aviation Medicine, Randolph Field.*

PROBLEM: To determine the communality between training level criteria of adjustment to Air Force flying duties obtained from different sources, to isolate independent dimensions among the criterion measures, and to study the relation of training level criterion factors and predictor tests correlated with them to posttraining criteria.

SUBJECTS: 666 Air Force cadets who completed pilot training at Randolph Air Force Base between 1950 and early 1952.

PROCEDURE: A group of 24 ratings by psychologists was factor analyzed and six factors were found. A second analysis including factor estimates from the first analysis, peer and superior ratings, and objective data was accomplished. Seven criterion dimensions were found. These were: Military Aptitude, General Ability, Personal Adjustment, Flying Performance, Age, Air Force Motivation, and Educability. Factor-score estimates for each of these factors, scores from training-level predictor tests, additional ratings by psychologists, and a posttraining criterion based on the Air Force Form 66 (personnel record) were intercorrelated.

RESULTS AND CONCLUSIONS: Variables from different sources, loaded on the same factors, demonstrated communality between the measures. Three of the seven factors, all three of the additional psychologist ratings, and two of the four predictor measures correlated significantly with the follow-up criterion. This indicates that the same factors are significant in successful adjustment to flying in both the training and posttraining situation. The comparability of the correlations between the predictor devices and the training-level criteria, and the predictor devices and the follow-up criterion, indicated that for these measures the loss in predictive efficiency through time was relatively small. Restriction in range from both preselection and selection in the training situation undoubtedly attenuated the relationships found in this study. Even with this attenuation, the results are relatively clear-cut, and strongly suggest that long range prediction of successful adjustment to Air Force flying duties is both possible and feasible.

3:25. The prediction of a criterion of flight safety in naval aviation. JAMES F. PARKER, JR., *Naval Medical Research Institute, Bethesda, and RAY C. HACKMAN, University of Maryland.*

This study was designed to investigate differential accident liability among Naval flight personnel. Studies in industry have indicated that some individuals contribute disproportionately to the total number of industrial accidents. This study evaluated "peer ratings" as a means of identifying such individuals in aviation. In addition, the following vari-

ables were evaluated as predictors of relative safeness and skill as a pilot: (a) attitudes toward various aspects of Naval flying, (b) judgmental evaluations of projected items of flight safety procedure, and (c) a pilot's galvanic skin response upon viewing the same items of safety procedure.

Subjects were ninety pilots assigned to a U. S. Navy aircraft carrier. These pilots rated the other members of their squadron both as to safeness and skill. It was found that a criterion of accident liability derived from these "peer ratings" was easily obtained, was reliable, and was related significantly to each of the independent variables used in this study.

Multiple regression analyses indicated that major differences exist between low and high ranking officer groups with respect to the manner in which relative safeness must be evaluated. For predicting relative safety and skill, multiple R 's were obtained ranging from .48 to .68. All were significant at the .01 level of confidence.

Canonical correlational analyses, conducted to determine the efficiency with which a pilot could be evaluated for safeness and skill simultaneously, yielded coefficients of .58 for the Ensign group and .74 for the senior officers.

It was also concluded that:

1. A pilot's attitudes toward flying are related to his relative safeness and skill.
2. For Ensigns, the safer pilots consistently overestimate the importance of flight safety procedures.

3. For senior officers, less safe pilots show more GSR responses when viewing safety procedures.

Slides.

3:40. Examination of the consistency of trouble-shooting performances. HAROLD R. LAPORTE, JR., GLENN L. BRYAN, AND NICHOLAS A. BOND, JR., *University of Southern California*.

PROBLEM: The behavior associated with the process of trouble-shooting electronic equipment has been the subject of many investigations. Most analyses of this behavior are directed to practical problems of criterion definition, selection test development, and job requirement specification. These applications usually require an over-all evaluation of performance so that the relative standing of technicians can be determined. For a more basic understanding of the determinants of trouble-shooting behavior, it is worthwhile to analyze the behavior in terms of the internal characteristics of the trouble-shooting sequence. The present paper is devoted to an exploration of four aspects expected to represent important features of the process.

SUBJECTS: 110 naval electronics technicians.

PROCEDURE: Over 1,500 detailed trouble-shooting records were available for analysis. These were collected from several field administrations of job sample and synthetic trouble-shooting problems. Samples were drawn from this pool of records and analyzed in terms of such factors as: (a) the frequency of different methods of attack, (b) the effects of success on perseveration of the trouble-shooting method employed on subsequent problems, (c) the stability of "Proximity" and "Clue Quality" measures when the performances are fractionated into quarters, and (d) the consistency of various quantifiable performance elements across a series of problems and across a shift in the electronics equipment used as the test vehicle.

RESULTS AND CONCLUSIONS: The intersubject and interproblem variability of the parameters examined strongly support the hypothesis that technicians neither employ nor even attempt to formulate a standardized trouble-shooting method until considerable experience with the particular electronics equipment has been gained. The results are interpreted in terms of the general goal of specifying those features of trouble-shooting behavior which are stable enough and general enough to deserve systematic experimentation. Practical implications of the data analysis for measurement and training are indicated.

Slides.

3:55. A three-hour performance test to evaluate job effectiveness of Army radar mechanics. JAMES E. WHIPPLE, ROBERT D. BALDWIN, ROBERT F. MAGER, AND ROBERT VINEBERG, *Human Resources Research Office, The George Washington University*.

PROBLEM: To develop a field proficiency test capable of being administered on an operational piece of complex electronic equipment—an Army integrated fire-control radar system. This test was developed as part of a research program designed to (a) measure on-the-job effectiveness of radar mechanics, (b) study their trouble-shooting methods, (c) evaluate training curricula.

PROCEDURE: On the basis of field studies of radar mechanic job activities, three job areas were selected to be sampled by the test: (a) trouble shooting, (b) field adjustments and preventive maintenance, (c) energizing and operation.

Eight criteria were established for selecting test items. Appropriate tryout procedures were employed to ensure meeting these criteria, and a preliminary form of the test was administered to 50 graduating students from an Army radar mechanic training program. Results of this testing were used to establish

scoring procedures. Two additional graduating classes were tested, scoring procedures were verified, and a distribution for graduating mechanics established. The test was also administered to 75 radar mechanics in the field. These scores provide an estimate of improvement in mechanic proficiency as a function of length of experience on the job.

RESULTS: The feasibility of developing an adequate performance test which can be administered on the operational electronic equipment has been demonstrated. The completed test requires three hours or less depending on the examinee's proficiency. Test materials, in addition to the operational equipment, include spare parts, tools, and three pieces of electronic test equipment. Time and quality of performance determine total score. A timed, step-by-step record of trouble-shooting and field-adjustment behavior is made. Characteristics of the instrument, including estimate of internal consistency, interexaminer reliability will be discussed. Correlation coefficients between test scores and various training course grades, and between test scores and Army selection instruments will also be presented.

Slides.

Division 2. Symposium: Problems in Research in Undergraduate Teaching of Psychology

3:50-5:50. Borgia Room, St. Francis

FRANK W. FINGER, Chairman

Participants: JOHN E. MILHOLLAND, SUMNER C. HAYWARD, AND MARJORIE A. OLSEN.

Division 3. Vision II

3:50-4:50. Room 2127, Sheraton Palace

ALPHONSE CHAPANIS, Chairman

3:50. Spread of retinal excitation induced by a visual stimulus, using the electrical phosphene threshold. RICHARD M. MICHAELS, *Sound Division, Naval Research Laboratory*.

K. Motokawa has presented evidence that a visual stimulus induces in neighboring regions of the retina an increase in sensitivity which varies inversely as a function of distance from the border of the stimulus. The purpose of the present research was an attempt to verify and extend these findings and examine the applicability of the use of the electrical phosphene threshold to other problems of visual perception.

Two female subjects were used. Each was presented in sequence with a pattern composed of two yellow dots followed by a square, white, probe light followed after 1.50 seconds by a 100 ms. electric stimulus to the right eye. The current of this pulse was found to be the significant variable and was used throughout. The threshold was measured to the white

probe light as it was moved in two dimensions about the yellow dots.

The induction effect was measured as the difference in threshold of the white probe light before and after stimulation with the yellow dots, and this was plotted against distance from the border of the figure. From these curves the field of equi-induction lines was constructed about the yellow dots.

The results verify the findings of Motokawa on this spread of excitation and its change with distance. At points intermediate between the two dots the induction effect tends to be the sum of the separate inductions relative to the distance of the point from each of the stimulus figures. The field about each of the dots shows symmetry with respect to itself and with the other dot. In general the variability of the threshold is low for points in which there is little interaction between the stimulus dots and increases at points intermediate between them. The phosphene threshold appears to be useful means of dissociating retinal correlates of monocular perception.

Slides.

4:05. Effect of pre-adaptation illumination on phosphene thresholds during dark adaptations. O. THOMAS LAW AND RUSSELL L. DE VALOIS, *University of Michigan*.

METHOD: Thresholds for central and peripheral phosphenes were determined once a minute in the course of dark adaptation following light adaptation to various levels. The pre-adaptation conditions used on the three subjects were: 500, 100, and 10 ft. lamberts of white light, and 100 and 10 ft. lamberts of red light. The electrical stimulus was pulsating DC of 20 cps.

RESULTS: 1. For both central and peripheral phosphenes there is an initial drop in threshold at the start of dark adaptation followed by a small rise, for central, and a sharp rise, for peripheral flicker.

2. Brightness of pre-adaptation light has little differential effect on central phosphene curves, but considerable effect on those for peripheral phosphenes. In general, high pre-adaptation produces higher peripheral maxima.

3. The differential effect of pre-adaptation level on central as against peripheral phosphenes suggests that predominantly cone and rod systems might be involved in the two types. To further explore this possibility, red pre-adaptation light, which would stimulate cones relatively more than rods, was used. The resulting central curves were little different than when white light was used, but the peripheral curves were grossly different in slope.

CONCLUSIONS: This study points out that central and peripheral phosphene thresholds follow different time

courses during dark adaptation and react differently to different conditions. The results seem to indicate that two different neural systems, which may be the rod and cone systems, are involved.

Slides.

4:20. Very early intermediate level dark adaptation.

HOWARD D. BAKER AND MICHAEL D. DORAN,
Florida State University.

When an adapting luminance is dimmed, the difference threshold drops progressively in a dark-adaptation curve. The curve is similar to the familiar curves obtained with absolute thresholds when the adapting light is turned off completely. The present experiment has traced the beginnings of the intermediate level adaptation curves, from 0.25 sec. before the light is dimmed until two sec. after.

A three-channel Maxwellian view adaptometer was used. The adapting field was white and subtended a visual angle of 20°. Difference thresholds were measured by a 0.02 sec. flash of white light, 1° in diameter. The light sources were glow modulator flash tubes, timed and programmed by Roush electronic timers. The timers permitted the stimulus flash to be presented very precisely with respect to the moment when the adapting field was dimmed.

The psychophysical method was the ascending series of the method of limits. Measurements were taken both in the fovea and five degrees in the parafovea. There were two subjects, both men who were experienced in judging visual thresholds.

The difference threshold early dark adaptation curves were found to show characteristics very similar to corresponding absolute threshold curves. There is an immediate rise in threshold resulting from the depression of end-organ activity which occurs when any light is dimmed. This is followed by a steep drop in threshold, which levels off into the regular dark-adaptation curve. As with the absolute threshold, a latency effect makes the threshold change appear to anticipate the adapting luminance change. The extent of the changes depends upon the level to which the adapting luminance is dimmed.

Foveal and parafoveal curves are similar. This is to be expected, since the early portions of all parafoveal dark-adaptation curves reflect only cone activity.

Slides.

4:35. Photopic and scotopic components of the light-adapted human electroretinogram. WILLIAM R. BIERSDORF AND JOHN C. ARMINGTON, *Army Medical Service Graduate School, Walter Reed Army Medical Center.*

PROBLEM: Previous study of the human electroretinogram has revealed that it may be selectively reduced in relative spectral sensitivity upon the administration of colored adaptation stimuli. There has been some question, however, as to whether such effects are produced by a shift between relative scotopic and photopic sensitivities or by a shift in sensitivities of individual photopic color mechanisms. The use of flickering stimuli in the present study of colored adaptation is thought to have permitted identification of separate photopic and scotopic components in the light-adapted ERG.

PROCEDURE: Electroretinograms were recorded with a contact lens electrode and a Grass amplification system. They were elicited by 0.01 sec. test flashes flickering at a rate of four flashes per second upon a steadily illuminated adaptation field. Both test and adaptation stimuli subtended a visual angle of 60° and were administered through Maxwellian view of the final lens of an optical stimulator. There were red, yellow, green, blue, and white adaptations. All responses were recorded from light-adapted eyes.

Two observers were used.

RESULTS: The electroretinograms were characterized by a double-peaked positive potential. With white adaptation the first peak had a spectral maximum at 550 mu while that of the second was approximately 500 mu. Colored adaptation lowered the over-all sensitivity of the second wave, but there were no apparent selective effects. Colored adaptation also depressed sensitivity of the first wave throughout the spectrum, but the greatest effect occurred in the wavelength region corresponding to the color of the adaptation light. The results are of significance for the duality and color theories.

Slides.

Division 3. Motivation I

3:50-4:50. English Room, Sheraton Palace

RICHARD L. SOLOMON, Chairman

3:50. "Externalization" of drinking behavior in rats. CHARLES A. THOMAS, JR., *University of Pennsylvania and Camp Gordon Army Hospital.*

PROBLEM: To determine if neutral external stimuli can acquire the capacity to elicit drinking behavior as a function of the frequency and consistency with which they are associated with thirst drive reduction.

SUBJECTS: 38 hooded female rats.

PROCEDURE: Two groups of 19 rats which had been equated for weight, emotionality, and drinking capacity were allowed to drink to satiation 30 times in special drinking environments only, under 12-hr. water deprivation. Except for a 20-min. drinking period every 12 hours, the animals remained in their

home cages. An Experimental group received water in a single drinking environment 30 times while a Control group drank in 11 different environments over the 30-trial period. The drinking environment for the Experimental group was one of those experienced by the Control group. At the end of the 30 trials the two groups were given water under minimal deprivation in the drinking situation which both had experienced.

RESULTS: The Experimental group consistently consumed more water than the Control group over the later drinking trials. On the satiation trial the Experimental group did not exceed the Control group in amount of water drunk. The implications of these findings for the learning of drives will be discussed.

4:05. The development of preference for a previously nonpreferred substance. ROBERT A. BAKER, *Stanford University*.

PROBLEM: It is well known that hungry rats will drink large quantities of saccharin solutions although saccharin has no known hunger-reducing properties. Moreover, when certain saccharin solutions are paired with sugar solutions, hungry rats prefer the sugar. These facts suggest that saccharin consumption represents a "learned drive." According to Dollard and Miller, learned drives vary with the principles and conditions of learning and should be strengthened by reinforcement. If the incentive value of saccharin is acquired and it is paired with a primary reinforcer, saccharin consumption and its preference value might be expected to increase.

SUBJECTS: 20 experimentally naive rats.

PROCEDURE: Preference for sugar solutions was established by presenting the subjects with a choice of a 1.5 per cent sucrose solution and a 1.3 per cent saccharin solution for a 20-day period. On alternate days when the solutions were present no food was given.

Following this period, half of the subjects, selected at random and comprising the experimental group, were deprived of food for 24 hours and then supplied with Purina saturated with the saccharin solution. After another 24-hour deprivation period the subjects were supplied with pure sucrose. This day-to-day experimental procedure was continued for a period of 40 days.

Following a 7-day readjustment period, both experimental and control subjects were deprived of food and tested for their preference of the sugar and saccharin solutions.

RESULTS: All control subjects preferred the 1.5 per cent sugar solution. Of the experimental group, eight revealed a decided preference for saccharin. The

two remaining subjects showed no preference for either incentive.

CONCLUSIONS: The results suggest that preferences may be reversed by pairing a nonpreferred substance with a strong reinforcing agent. Although the evidence is indirect, support was obtained for the hypothesis that saccharin consumption represented a "learned drive" and is strengthened by reinforcement.

4:20. An investigation and clarification of the parameters defining drive. EUGENE H. EISMAN, *University of California, Riverside*.

Recent work has shown that rats fed for one hour and run four and 22 hours later did not differ in learning a brightness discrimination. To explain the absence of differential learning under different hours of deprivation (h), it was hypothesized that Hull's single parameter definition of drive is incomplete. A second parameter corresponding to total deprivation per unit time was suggested and designated constant deprivation state (Cs). An adequate definition of drive must specify both h and Cs . It was further hypothesized that h is related to the emptying time of the stomach and is therefore maximum within four hours. The above results can thus be explained by assuming h and Cs equal, since both groups were run four or more hours after feeding and were fed for one hour out of 24.

To test this formulation Groups 1-3 were fed for 1 hour out of 48 and were run 45, 22, and four hours after feeding, respectively. Groups 4 and 5 were fed for 22 and 43 hours out of 48 and were run 22 and four hours later. In line with the two-parameter hypothesis, Groups 1-3 were equated for Cs , since they were run four or more hours after feeding. Groups 4 and 5 were lower than Groups 1-3 for Cs but were equivalent to Groups 2 and 3, respectively, for the usual measure of drive, h . It was predicted that Groups 1-3 would show no differences in learning despite differences in h . Group 4, although equivalent to Group 2 in h , was expected to learn more slowly due to the lower Cs . Similarly, it was predicted that Group 5 would be the slowest.

The data yielded significant differences and lack of significance as predicted. It was concluded that some sort of two-parameter definition of drive is necessary.

4:35. Stimulus generalization of an instrumental response under high and low levels of drive. J. ROBERT NEWMAN, *University of Illinois*.

PROBLEM: To test Hull's theory of stimulus generalization with respect to the level and shape of the generalization gradient under high and low levels of drive.

SUBJECTS: 120 albino rats.

PROCEDURE: All subjects were trained to push open a panel in the center of a 79-sq. cm. white circle for food reward. Sixty training trials were given. These animals were then divided into two equal sized groups. One group was subjected to a 48-hour food deprivation period (high drive) and the other to a 12-hour food deprivation period (low drive). These main drive groups were further subdivided into four subgroups each. Each subgroup of the main drive groups was then tested for generalization on one of four stimulus circles constituting the stimulus dimension. The circles utilized were 79, 50, 32, and 20 sq. cm. in area. The response measures of generalization were reciprocal of the latency of the first response, and number of responses in 35 extinction trials to the test stimulus. If the animal failed to respond in 30 sec. on any one trial that trial was scored as "no response."

RESULTS: The results of this experiment demonstrated: (a) the stimulus generalization gradient is a negatively accelerated decreasing function of the log area of the stimuli employed. This holds for both high and low drive. (b) The gradient is higher, i.e., response strength is greater under high drive than under low drive conditions. (c) The generalization gradient was also steeper under high drive than under low drive although the difference between the slopes of the two curves was not statistically significant. The above results held for both response measures. Results of curve fitting procedures applied to the two curves are in striking agreement with the implications of Hull's multiplicative hypothesis ($E = \bar{H} \times D$) concerning the relation of habit and drive to stimulus generalization.

Slides.

Division 5 and Psychometric Society. Statistical Methodology

3:50-4:50. Comstock Room, Sheraton Palace

RHEEM F. JARRETT, Chairman

3:50. Statistical tests in the comparison of curves by means of orthogonal components of trend.

DAVID A. GRANT, *University of Wisconsin*.

This paper extends the well-known Alexander Trend Analysis procedure in two respects. The Alexander procedure applies where there are a series of scores, obtained by repeated trials on the same subjects, in two or more groups. It provides for comparison of the groups in terms of: (a) their mean differences, (b) differences in the linear components of the group trends, and (c) differences in the pooled higher-order components of the group trends. The present procedure is more analytic in that: first, the groups may be compared separately in terms quad-

ratric, cubic, and any further orthogonal components of the trends; and secondly, if the groups form an orthogonal array, e.g., rows and columns, the row, column, and interaction variation may be examined separately for linear, quadratic, cubic, etc. differences.

The tests are obtained by constructing covariance terms by means of the orthogonal polynomials. Using Cochran's theorem, it is easily shown that, with a mathematical model, linear in the orthogonal polynomial components, with normal, random, and equal error variation, the separate component tests conform to the F distribution.

A routine method of calculation of the sums of squares has been worked out with suitable checking procedures. This and an illustrative problem will be distributed in dittoed hand-outs.

The procedure is limited to cases where the intervals between trials or levels of the corresponding independent variable are equal on a linear, logarithmic or similar scale. It has proved most valuable in our laboratory for comparing experimental curves separately with respect to slope, curvature, inflections, and the like. It is not particularly efficient when the curves are expected to follow exponential or other transcendental functions.

4:05. A measure of bivariate relationship derived from the ellipse of concentration. DONCASTER G. HUMM, *Humm Personnel Consultants*. (Sponsor, Irving Lorge)

PROBLEM: to discover a measure based on standard (z) scores having these characteristics: (a) orthogonal measurement, (b) progress by equal increments from zero to perfect relationship, (c) facilitation of analysis of any curvilinearity, (d) interpretable in terms of Pearson's r .

Cramér's parametric equation for the homothetic ellipses of inertia was studied. It is $z_1^2 - 2rz_1z_2 + z_2^2 = c^2$, where c is any uniform degree of concentration. When the first and second moments of the variable (since $z_1 = z_2 = 1$) coincide with those of the ellipse, then $c = \sqrt{2(1-r)}$, a formula for σ_{diff} for $+r$ and for σ_{sum} for $-r$.

When the x - and y -axes are rotated 45° they coincide with the major (M) and minor (m) axes of these homothetic ellipses, so that

$$M = \sqrt{2}(x + y) \text{ and } m = \sqrt{2}(x - y)$$

but σ_s coincides with M and σ_d with m , so that M is the locus of zero differences and m of zero sums. Thus orthogonal measurement is achieved and any departure from linearity determinable.

The ratios σ_d/σ_s and σ_s/σ_d , by measuring any departure from perfect correlation, are measures of alienation. These ratios are $\cos \theta$ where $\sin \theta = e$, the eccentricity of the ellipse. Since $\cos \theta + \text{vers} \theta$

$= 1$, versine θ is the required measure of relationship, with progress in equal intervals.

Letting

$$\text{vers } \theta = +\Upsilon = 1 - \sigma_d/\sigma_s \text{ and } \cos \theta = +\Lambda = \sigma_d/\sigma_s$$

and

$$\text{vers } \theta' = -\Upsilon = 1 - \sigma_s/\sigma_d \text{ and } \cos \theta' = -\Lambda = \sigma_s/\sigma_d$$

we find

$$r = \frac{1 - \Lambda^2}{1 + \Lambda^2} \text{ and } \Upsilon = 1 - \sqrt{\frac{1 - r}{1 + r}}$$

making r interpretable in these measures with uniform increments.

4:20. An empirical verification of the standard errors of the minor means. NATHAN JASPER, *National League for Nursing*.

PROBLEM: Standard error formulas for the minor means were presented very recently. The development of the formulas followed from certain theorems in probability. The purpose of this study was to determine how well the formulas predicted actual measurements when samples were selected at random from a rectangular distribution.

The minor means occur unexpectedly in a number of instances. For example, the harmonic mean is required in work-limit tests. The contraharmonic mean provides a measure of the impact of the group on the individual.

PROCEDURE: A deck of 99 cards, punched from 1 to 99, was prepared. Certain functions of these numbers needed for computational purposes, and also digits taken from a table of random numbers, were punched into the cards. The cards were reproduced 11 times, with variations in the random digits field. The deck of 1,188 cards was then run through a tabulator approximately 100 times, with constant resorting on random digits throughout the run. The tabulator selected cards for inclusion in the samples at unpredictable intervals varying from 10 to 100 cards, and it started selecting a new sample after selecting 40 cards. In this way 106 samples of 40 cards each were formed. For each type of mean, the standard deviation of the 106 means was found. The standard error of each type of mean, based on an N of 40, was also found by formula.

RESULTS: The standard deviations of the sample or means corresponded quite well to the standard errors computed by formula. For each mean, the empirical standard error was somewhat greater than the theoretical standard error, by amounts ranging from 9 to 17 per cent.

CONCLUSION: The standard error formulas for the minor means may be accepted as good approximations when the use of the minor means is required.

4:35. The problem of simple combination scores in measurement. EUGENE A. COGAN, *Human Resources Research Office, The George Washington University*.

A personality trait often requires the combination of two scores for its measurement; e.g., the phenomenon of classical rigidity rests upon the rate of performing a task in an unusual manner in relation to the rate of performance in the normal manner. The former may be conceived as the experimental value and the latter as the control.

Commonly, combination is achieved by (a) using a simple difference score, or (b) using a ratio score. These two procedures have in common a simple intuitive appeal; however, it will be shown that both have serious limitations which introduce serious artifact.

The two characteristics desired in a combination score are: (a) the score be independent of the control score, and (b) the score be maximally related to the experimental score.

The problem of linear combination may be represented symbolically as follows:

S = The combination score,

X = The experimental value in standard score form,

C = The control value in standard score form,

k = The constant term in the linear combination.

$$S = X - kC. \quad (1)$$

It can be shown that:

$$r_{xc} = \frac{r_{xc} - k}{\sqrt{1 + k^2 - 2kr_{xc}}} \quad (2)$$

$$r_{sx} = \frac{1 - kr_{xc}}{\sqrt{1 + k^2 - 2kr_{xc}}}. \quad (3)$$

The case of the simple difference score is represented by setting k equal to one.

The optimal solution to the linear combination score in terms of the desiderata described above generates the partial regression equation; i.e., $k = r_{xc}$. In that case, $r_{xc} = 0$ and $r_{sx} = \sqrt{1 - r^2}$, representing all the variance independent of C .

To illustrate the differential consequences of the partial regression equation and the simple difference score, the results of assuming $r_{xc} = .3$ are illustrated by substitution into equations (2) and (3). Using the simple difference model leads to: $r_{xc} = -.69$, and $r_{sx} = .69$. Using the partial regression model leads to: $r_{xc} = 0$, and $r_{sx} = .9$.

It can also be shown that the ratio score has undesirable characteristics. For example, in the case of the ratio model, r_{xc} is a function of the mean of X which is an arbitrary value in testing.

Division 5. Symposium: Methodological Problems of Accident Research

3:50-5:50. Concert Room, Sheraton Palace

ROBERT L. THORNDIKE, Chairman

Participants:

PHILIP H. DUBoIS. The role of correlational analysis.

WILLIAM L. SAWREY. Some logical and statistical problems in research on "accident proneness."

NEIL D. WARREN. Measurement of exposure.

ROBERT FITZPATRICK. The deficiencies of accident data, and the use of crew proficiency checks in aviation.

Division 7 and 8. Symposium: Effects of the Mass Media upon the Behavior of Children

3:50-5:50. Italian Room, St. Francis

FRANKLIN FEARING, Chairman

Participants:

ARTHUR J. BRODBECK. The mass media as a socializing agency.

ELEANOR E. MACCOBY. A strategy for research on the effects of mass media.

Division 14. Special Session. Meeting and Social Hour of Psychologists Employed Full Time in Industry

3:50-5:50. Monterey Room, Sir Francis Drake

Division 19. Symposium: Recent Trends in the Study and Measurement of Trouble-Shooting (Problem-Solving) Behavior

3:50-5:50. Empire Room, Sir Francis Drake

GEORGE J. WISCHNER, Chairman

Participants: GLENN L. BRYAN, ROBERT M. GAGNÉ, ROBERT GLASER, AND ROBERT VINEBERG.

Psychometric Society. Business Meeting

5:00-6:00. Room 2127, Sheraton Palace

Division 3. Motivation II

5:00-6:00. English Room, Sheraton Palace

JOHN P. SEWARD, Chairman

5:00. The derived reinforcement value of a stimulus contingently associated with secondary drive reduction. J. V. MURPHY, R. E. MILLER, AND E. BROWN, *School of Medicine, University of Pittsburgh.*

PROBLEM: To test the prediction that a .5-sec. light stimulus contingently associated only with conditioned avoidance responses would acquire secondary reinforcing properties as evidenced by prolonged extinction.

SUBJECTS: 24 Wistar rats, 100 to 120 days old.

PROCEDURE: After a two-min. adaptation period in a modified two-compartment apparatus, the buzzer conditioned stimulus was presented. The unconditioned stimulus of shock was automatically delivered through the grid floor after five seconds if the animal failed to make the barrier crossing response to the buzzer. The buzzer or buzzer and shock were terminated when the animal responded. For the 12 experimental animals, each conditioned response was accompanied by a .5-sec. light stimulus throughout conditioning and extinction. It was never presented contiguously with shock. The control group procedure was identical with the exception that the light stimulus was not presented at any time throughout the experiment. Ten trials were run each day for the 15-day conditioning phase and the 15-day extinction phase. The daily trials were presented with an average intertrial interval of 60 seconds.

RESULTS: No significant difference in number of conditioned responses occurred during the conditioning phase; however, the groups diverged markedly throughout the course of extinction. Fisher's exact test of significance indicated significantly more ($p > .002$) conditioned responses during extinction for the experimental group.

CONCLUSIONS: A previously neutral cue contingently associated only with secondary drive reduction during conditioning acquires reinforcing properties as evidenced by prolonged extinction.

Slides.

5:15. Reward, time, and variability. EDWARD L. WALKER, *University of Michigan.*

Various existing theories lead to the expectation that the immediate effect of reward is to decrease variability. Existing empirical evidence leads to the supposition that the reaction decrement of a single reaction is relatively short. Hull's and Glanzer's formulations of reactive inhibition and stimulus satiation predict the decay of the reaction decrement with time to be a simple negative exponential decay function.

Theories and arguments are offered for the expectations that reward will have an initial effect of increasing variability, that a reaction decrement might last considerably longer than previously expected, and that the course of dissipation of the reaction decrement might be expected to show oscillation and be sustained over a period before undergoing a fairly abrupt drop.

Alternation phenomena were examined in a T maze with 126 rats, all thirsty and half reinforced with water in either arm of the maze on all trials and half never reinforced. The animals in each reinforce-

ment condition were divided into three groups, each group was tested seven times on seven different days at seven different delay intervals. Thus 21 different delay intervals were tested ranging from an operational delay of 15 seconds to four hours and 16 minutes with 21 animals tested each delay interval.

We found:

1. The rewarded group alternated significantly more than the unrewarded group.
2. The alternation effect, and thus by implication the reaction decrement from the first reaction, was still evident after approximately 90 minutes.
3. The form of the curve of dissipation of the reaction decrement was not the simple exponential decay function to be expected from passive dissipation of the residual effects of the reaction. It showed oscillations, and a rather steadily maintained decrement followed by a rather abrupt drop to a point below the 50% alternation level.

Slides.

5:30. Choice-point behavior as a function of successive changes in amounts of reward. A. CLINTON PEREBOOM, AND JOHN P. SEWARD, *University of California, Los Angeles*.

PROBLEM: Hull's Theorem 30 implies that a change in amount of reward (K) is learned like ${}_sH_r$ but independent of ${}_sH_r$. If so, this K -habit should be permanent. What happens to it if, without extinguishing it, we again change reward amount?

METHOD: 16 rats were given two free and two forced trials a day for 35 days in a T maze, with one 30-mgm. pellet on one side and five such pellets on the other. Rewards were switched on Day 11 for eight subjects (Group I) and on Day 22 for Group II. Both Groups were trained 12 more days to symmetrical rewards.

RESULTS: Group I reversed its initial preference in 11 days, Group II in 14 days. Mean errors were 9 and 12.5, a nonsignificant difference ($.10 > p > .05$). With symmetrical rewards, both groups showed a loss of preference, Group II making more "errors" than Group I ($p < .01$).

DISCUSSION: The data suggest that each change in the amount of reward displaces a previous K -habit by forming a new one, the rate of displacement varying inversely with the strength of the old habit. A slight modification of Hull's equation for ${}_sH_r$ would satisfy this interpretation.

Slides.

5:45. The effect of drive-stimulus generalization upon two-choice discrimination transfer. PAUL WILLIS, *Baylor University*.

PROBLEM: In Hull's system the drive-stimulus char-

acteristic of a given need state is assumed to acquire associative connection with reinforced responses. Presumably, such associative connections would play a role in both positive and negative transfer phenomena. The question here raised is this: Will subjects that have learned a simple brightness discrimination under anxiety motivation exhibit greater transfer effects in learning a new discrimination under anxiety than will a group of subjects that learned the original problem under nonanxiety motivation?

SUBJECTS: 40 male, naive, hooded rats approximately 90-150 days old from the colony maintained by the department of psychology at Carnegie Institute of Technology.

APPARATUS: Single-unit T maze with detachable stem and grid floors.

PROCEDURE:

Phase I. Experimental (X) subjects under anxiety (fear of shock) motivation were given 10 trials per day in the T maze until a simple brightness discrimination was established. Training was identical for Control (C) subjects who operated under 22 hr. hunger drive.

Phase II. An equivalent amount of anxiety (fear of black straightaway-shock) was established in X and C subjects.

Phase III. All subjects were trained on a brightness discrimination in a modified Y maze under anxiety motivation established in Phase II. The positive and negative external cues employed in Phase I were now reversed for half the subjects in both X and C groups.

RESULTS: Trials to criterion were analyzed by means of F and t tests. Both positive and negative divisions of the X group were found superior to their Control counterparts. The empirical data were Vincentized and then compared to theoretical curves based upon a modified version of Hull's '52 system on simple trial-and-error learning.

CONCLUSIONS: The results of the positive transfer situation were as expected from Hull's theory. Even the negative transfer results can be considered generally in line with what Hull would predict if a modified version of his theoretical account of simple trial-and-error learning is adopted.

Slides.

Psychometric Corporation. Business Meeting

6:00-7:00. Room 2127, Sheraton Palace

TUESDAY EVENING, SEPTEMBER 6

Psychometric Corporation. Meeting, Board of Directors

7:00-8:00. Room 2127, Sheraton Palace

**Meeting of the Divisional Program Chairmen for
1956 APA Convention**

8:00. Room 2002, Sheraton Palace

RICHARD P. YOUTZ, Chairman

Division 3. Reception

9:00. Comstock Room, Sheraton Palace

WEDNESDAY MORNING, SEPTEMBER 7

**Division 1. Symposium: Application of Logical
Systems in Psychology**

8:40-10:40. Italian Room, St. Francis

F. J. MCGUIGAN, Chairman

Participants:

DAVID BAKAN. The relationship between formal probabilistic logic and psychotherapy.

ABRAHAM KAPLAN. Limitations of exact logical systems in empirical application.

PATRICK SUPPES. Use and interpretation of mathematical models in psychology.

Division 1. Theoretical Papers

8:40-10:40. Borgia Room, St. Francis

FRANK W. FINGER, Chairman

8:40. Anatomical criteria and the study of the evolution of human behavior. HARRY J. JERISON, *Aero Medical Laboratory*.

The study of the phylogeny of human behavior can proceed by examining the primate line, because, as Straus has pointed out, the primates are primitive in most morphological features, and their specific direction of adaptation appears to be in the development of enlarged brains. Criteria for relative brain development of mammals and especially of primates could, therefore, serve as an anatomical framework for the ordering of species for comparisons.

According to Lashley, the only useful criteria for psychological purposes developed thus far derives from the brain weight: body weight ratio, the "index of cephalization" defined by the equation

$$\text{index of cephalization} = \frac{\text{brain weight}}{(\text{body weight})^{\text{constant exponent}}}.$$

The index as it stands is not usable because it is not independent of the body weight within the primates. A re-analysis of brain weight: body weight relations, however, yield a brain-weight factor which is independent of body weight and which can be assumed to be related to level of cerebral evolution. This analysis and its results for ordering contemporary primates, including man, will be discussed.

Comparisons within the primates are facilitated by the assumption of similarity in adaptive zone within the order. If we go beyond the primates the problem of direction of adaptation becomes serious, and control of this factor is necessary. Techniques for effecting such control and general difficulties for inter-specific comparisons will also be discussed.

8:55. Perception as substitute random trial and error. DONALD T. CAMPBELL, *Northwestern University*.

Selective survival among random variations is accepted as a generally useful paradigm for instances of organismic fit to environment. Darwinian theory of natural selection applies the model to the fit between the inherited characteristics of organisms and the opportunities provided by their habitats. Trial and error doctrines apply the model to learned fit between organismic response and environment. Ashby and Pringle have independently noted the formal parallel between evolution and learning in regard to the selective survival of random variations. (The term "random" is used in a limited sense.)

Attention is called to a third level of organismic fit to environment, in the adaptive responses employed in the flexible execution of well-learned habits. For blind organisms, the trial and error component in the carrying-out of a habit may be obvious, but for organisms with distance receptors, the smoothly-guided yet flexible character of the execution of learned response seems quite out of keeping with the random variation required by the model. An effort is made to resolve this incongruity by characterizing perceptual processes as substitute trial and error, containing a random search component which takes the place of overt random motor movements. The notion is a more primitive one than that of "vicarious trial and error." It seems relevant for the empirical inconsistencies in the problems of "what is learned" and "insight." As related to servo-mechanism models, the notion is to be clearly distinguished from the simple negative-feedback regulators, as thermostat or governor, in which the feedback comes from the outcome of the primary effector. But a suggestive parallel is available in complex servo-systems such as radar-controlled guiding of ship or projectile, in which a randomly emitted beam is selectively reflected, and is used to substitute for a blind trial and error of ship movements or projectiles.

9:30. The nature of the general-reasoning factor.

J. P. GUILFORD, NORMAN W. KETTNER, AND PAUL R. CHRISTENSEN, *University of Southern California*.

PROBLEM: A factor called "general reasoning" has been known to exist for more than 15 years. In spite of much research concerned with the factor, its nature has continued to mystify.

HYPOTHESES: Many hypotheses have been offered in attempts to define this factor. It has been suggested that general reasoning is synonymous with general intelligence; that it is, alternatively, an ability to do restrictive reasoning, to do quantitative or mathematical reasoning, to manipulate symbols, to solve problems, to comprehend problems, to test hypotheses, to organize steps in problem solutions, to use trial and error effectively, and to deal with complexity in problem solving.

CONCLUSIONS: A series of factor analyses by ourselves and others lead to the elimination of the doubtful status of all these hypotheses except the one having to do with comprehension of problems. It is concluded that, as a general principle, problem-solving is not a unique psychological event, and that each of the great variety of problems calls upon its own pattern of abilities for solution. Thus, the general-reasoning factor is probably limited to certain types of problems that have something in common with arithmetic-reasoning problems. An incidental result of exploration of the hypotheses has been the discovery of other factors that contribute to problem solving of different kinds.

9:50. On thought. I: Extrinsic theory of insight.

EUGENE GALANTER AND MURRAY GERSTENHABER, *University of Pennsylvania*.

The study of thought divides itself into investigations of trial and error and insight. However, the study of trial and error, so far, cannot demonstrate the complementarity of insight and trial and error as modes of thought.

The first step in the development of a theory of thinking is the development of an extrinsic or empirical definition of insight. The usual behavioral definition can be shown to be inadequate in at least three ways. These difficulties suggest three criteria which problems reflecting insight must possess.

An examination of experimental techniques to test insight require first an exact definition of the notion of a "problem" itself. This is accomplished through the introduction of the "payoff function." This is a function which assigns to each possible activity of an individual the reward the individual will receive if he adopts it. The payoff function coupled with an environmental situation defines a "problem."

A problem being defined, the notion of "characteristic levels of insight" can be made precise by the introduction of the "response curve," namely, the distribution of people over achievements for a fixed

problem. We then indicate the nature of the dependence of the response curve on the payoff function, and suggest a behavioral hypothesis about this dependence. Evidence for the plausibility of the hypothesis is presented.

Certain intuitive anomalies in recent research on learning are considered in the light of the previous discussion and resolved. This resolution allows the introduction of problems for which insight is demonstrable. Such problems are termed "normalized problems."

Empirical techniques for the development of normalized problems are suggested, but a more satisfying solution requires the a priori construction of normalized problems. Such theoretical considerations form the subject matter of an intrinsic theory of thinking, to be discussed elsewhere.

Slides.

10:50. On thought. II: Intrinsic theory of insight.

MURRAY GERSTENHABER AND EUGENE GALANTER, *University of Pennsylvania*. (Sponsor, EUGENE GALANTER)

A previous paper in this series defined insight in terms of extrinsic manifestations, and developed criteria for detecting insightful behavior. Here we face the problem of explicating a mechanism capable of displaying such behavior.

The problems used in the extrinsic theory consist of binary sequences in the environment plus an expectation of reward characterized by a payoff graph. The task of thought is to predict the sequence. To do this we propose that the individual internally constructs a sequence-generating function or recursive function; i.e., a function computable by a machine.

Since one major aim of the theory is to define the complexity of specific sequences, we must examine a measure on the class of recursive operators available to the individual. To predict a sequence requires the composition of a recursive function out of specific sequence-generating functions available to the organism. To each such primitive element we assign an "accessibility index," specifically, the log latency of its behavioral manifestation. The complexity of the sequence is described by the minimum sum of the complexities of the functions whose compositions may be used to generate the sequence. The measure on these primitive elements can be construed as probabilities. We hypothesize that this measure over the set of functions changes in time. Such changes are dependent on the payoff for the sequence, and take place according to a stochastic model.

Consideration is given to sequences containing two kinds of noise, and the effects of such noise on think-

ing are considered. Several empirical hypotheses are offered and experiments are proposed.

A realization of the mathematical model, which has been the principal content of this paper, is shown to be at least partially accomplished by Hebb's neurological theory.

Division 3. Probability Learning

8:40-9:40. Comstock Room, Sheraton Palace

WILLIAM K. ESTES, Chairman

8:40. Effect of double stimulus events in a verbal conditioning situation. NORMAN H. ANDERSON, *University of Wisconsin*. (Sponsor, David A. Grant)

PROBLEM: To test an extension of the equations of statistical learning theory for two-choice predicting behavior to the case in which the double stimulus events, neither event, or both events, may occur.

SUBJECTS: 192 elementary psychology students.

PROCEDURE: The two stimulus lights were randomly activated with certain probabilities. Subjects predicted which light would flash next by pressing exactly one of two keys in response to a signal tone. Four hundred 5-second trials were given without interruption. All groups were treated alike on trials 1-100 in which only the single events, right light alone, and left light alone, occurred. For trials 101-400, a changed set of stimulus probabilities induced changes in response frequencies. For two groups, the stimulus sequences still contained only single events. The remaining six groups formed a 3×2 design with type (neither light, both lights) and frequency (30, 45, and 60 per cent) of double event as factors, with one single event fixed at 15 per cent frequency.

RESULTS: Two groups were used to evaluate the theoretical parameters associated with the double events. These values, together with learning rates from trials 1-100, generated theoretical curves for trials 101-400. Only the two groups with double-event frequencies of 60 per cent deviated significantly from theoretical asymptote. There was less agreement between predicted and observed total responses on trials 101-400. Analysis of variance on the 3×2 design showed that frequency, but not type, of double event was significant.

The difference of the conditional probabilities of response following the two single events gives a partial measure of stimulus control over subject. For the 3×2 design, trend analysis of this quantity over trials 101-400 showed significant between-groups trend arising from double-event frequency and from type-frequency interaction.

Slides.

8:55. The value of anticipated events as a determinant of expectancy learning and extinction.

VAUGHN J. CRANDALL, *Fels Research Institute*, DAN SOLOMON, AND RICHARD KELLAWAY, *Antioch College*.

PROBLEM: To investigate the effects of the value of events on the learning and extinction of verbal expectancies for these events.

PROCEDURES: During each of a series of guessing trials, the subjects, 30 college girls, were required to anticipate whether a red light or green light would flash subsequent to their guess. During 100 learning trials, the red light flashed after 70 per cent of the trials and the green light flashed after 30 per cent of the trials. During 30 extinction trials, the green light flashed after each trial and the red light never flashed. The anticipated events, the flashing of the lights, were given certain values. The occurrence of the green light always had neutral value, i.e., no money was won or lost by subject if it flashed. On half the trials the occurrence of the red light had positive value, i.e., subject won ten cents if it flashed; on half the trials the red light had negative value, i.e., subject lost ten cents if it flashed. Before each guessing trial, subject was told whether she would win or lose ten cents if the red light flashed. Temporal order of trials where subject was told she would win or lose ten cents if the red light flashed was random.

RESULTS: (a) During the learning period, while red light expectancy statements significantly increased regardless of whether the red light had positive or negative value, the rate of acquisition of these expectancies was more rapid when the occurrence of the light had positive value. (b) However, by the end of the learning period the red light was anticipated no more frequently when it had positive value than when it had negative value. (c) At the beginning of extinction, red light expectancies were again more frequent when the light had positive value. (d) With increased extinction trials, this difference disappeared.

CONCLUSION: The value of anticipated events determines expectations for their occurrence in the early phases of learning and extinction but, with increased trials, the effect of value on expectations disappears.

Slides.

9:10. Involvement and set as determinants of behavioral stereotypy. RAY HYMAN AND NOEL S. JENKIN, *Harvard University*.

Our problem was to evaluate the effects of instructions upon subject's sequential behavior in a problem-solving situation.

THE TASK: We presented subject with the following

problem-solving situation. Subject sat at a table upon which was a deck of 108 cards, face down. The experimenter turned the cards face up one at a time. Before each card was turned face up, subject had to predict whether its color would be red or black. His task was to make as many correct predictions as he could. The sequence of colors was random and, thus, the problem was insoluble.

THE MEASURE: From subject's behavior in this situation, we obtained the following measures: 1. *An index of behavioral stereotypy.* This was a measure of how subject's prediction on any particular trial correlated with what happened on the preceding two trials. 2. *Evaluation of performance.* At the end of the task, subject was asked to state on what percentage of the trials he was correct. 3. *Level of expectation.* Subject was asked to state the percentage of correct hits he would make if run through the deck again.

SUBJECTS: The subjects were 40 male undergraduates attending Harvard College.

PROCEDURE: Each subject was randomly assigned to one of four groups. Each group consisted of subjects who received one of the four combinations of our two independent variables, Involvement and Set. Half of the subjects were told that the problem was insoluble, and the rest were told that it was soluble. Half of the subjects in each of these groups were given instructions designed to keep them from being involved with the task; the other half were given instructions designed to involve them with the task.

RESULTS: Telling subject that the problem is insoluble produces a significant increment in stereotypy.

Involvement has no effect on a subject who believes the problem is insoluble, but it has a significant effect on a subject who believes the problem is soluble. Subjects in the involved-structured group grossly underevaluated their performance, had the highest level of expectation, and tended to be more stereotyped than subjects in the noninvolved, structured group.

Slides.

9:25. Expected value as a determiner of successive two-choice decisions. ROBERT M. PETERSON, Brigham Young University.

PURPOSE: The expected value, *EV*, associated with a given alternative in a multiple-choice situation is a function of the probabilities and values of the possible outcomes. Where there are two possible outcomes, success and failure, *EV* is given by

$$EV = pG - qL,$$

where *p* is probability of success, *q* is probability of failure, and *G* and *L* are amounts of something, e.g., money, points, etc., which may be gained and lost, respectively. An earlier study showed that the differ-

ence between *EV*'s associated with the alternatives, *dEV*, was an important determiner of successive choices made in a simple two-choice situation. The purpose of the present study was to determine whether or not the effect of *dEV* is independent of the particular outcome values involved.

PROCEDURE: Thirty volunteer subjects predicted which of two lights would occur, i.e., come on, on each of 250 trials. The probabilities of occurrence of the two lights were .75 and .50. There were four possible outcomes of prediction: successful and unsuccessful prediction of the right and left lights. The specific point values assigned to each of these possible outcomes were such that *dEV* occurred at these three levels: 0, 1, and 2. Ten subjects were run under each *dEV* condition. Five subjects in each *dEV* group worked with a certain set of outcome values and the other five subjects worked with a different set of outcome values.

RESULTS: The proportion of predictions of the light with the greater associated *EV*, op-predictions, gradually increased over the 250 trials. The mean number of op-predictions during the final 100 trials was directly related to *dEV*. This effect was not independent of the particular outcome values involved. With constant *dEV*, the mean number of op-predictions was significantly depressed by an increase in the outcome values associated with the greater-*EV* light.

Slides.

Division 3. Physiological Psychology III

8:40-9:40. Room 2127, Sheraton Palace

M. A. WENGER, Chairman

8:40. An investigation of the physical correlates of cutaneous electric shock. GEORGE E. MOUNT, University of California, Los Angeles.

PROBLEM: To determine the electrical stimulus measurements which must be made for a physical specification of the intensity of cutaneous electric shock.

PROCEDURE: Measurements were made of the electric potential, current, and phase associated with the absolute threshold using a sixty-cycle electrical stimulus applied to the digital palmar surface. Data were collected on two occasions for ten subjects, using two areas for stimulation and two methods of electrode application. The electrical potential measurements were recorded for each trial using a cathode ray oscilloscope. The oscilloscope record was obtained at threshold by having the subject press a key to activate an oscilloscope camera. The camera records were enlarged and the readings made using a graphic technique.

RESULTS: The data provided information of the potential, current, and phase relations associated with threshold stimulation and permitted a determination of the equation for minimum variability for each of the sources of variation introduced by the experimental procedure. The equation for minimum variability is of the form $I - kE$ and indicates that as the subject resistance varies, the current should be varied slightly to compensate. However, little reduction in variability occurs with this formula over that for which the current is held constant. This result is the reverse of expectation on the assumption of a power formula for shock specification. Phase is not importantly related to the conditions determining sensitivity.

CONCLUSION: The effect of variations introduced in this experiment lead to the tentative conclusion that electric current is the important stimulus property controlling the intensity of cutaneous electric shock. This result is consistent with recommendations published in the early psychological literature and is at variance with recently published recommendations for the specification of electric shock in terms of electrical power (EI).

Slides.

8:55. Permanence of effect of a series of ECS on activity-wheel and open-field behavior. JOHN A. STERN, *Washington University School of Medicine, St. Louis.*

The effect of a series of 15 daily electroconvulsive seizures on activity-wheel and open-field behavior was measured 20 and 55 days after initiation of ECS for activity-wheel running and 30, 65, and 100 days after initiation of ECS for open-field behavior. Activity-wheel measures consisted of 10 consecutive one-half hour daily trials in activity wheels. Open-field behavior was observed for five daily two-minute exposures. Measurement of open-field behavior consisted of amount of activity shown on the field and a series of behavioral measures defined as reflecting "emotional" behavior. Under the latter label were included such observations as amount of face washing, rearing on hind legs, turning, crouching, defecation, etc. The series of ECS described above produced significant changes in open-field behavior as measured 30, 65, and 100 days after initiation of the series of ECS. The changes, in general, consisted of a decrease in activity and an increase in "emotional" behavior. These changes in behavior appeared at the first post-ECS testing and persisted throughout the experiment. Activity-wheel running, as measured in the present experiment, did not discriminate between the experimental and control groups.

9:10. The trial-to-electroconvulsive shock time interval and maze learning in rats. FRANCIS LEUKEL, *University of Washington.*

Experiments using 125 rats investigated the relationship between the trial-to-electroconvulsive shock time interval and learning behavior. A process of habit trace consolidation may follow each learning trial. An ECS treatment following each trial could impair learning by: (a) interrupting consolidation, or (b) retroactively disorganizing the consolidating trace. Subjects were given different treatments in three experiments after each of the first ten daily trials of learning a 14-unit water maze. The interval between each trial and the following treatment was varied.

1. A group given ECS two hours after each treatment trial made significantly more mean errors than controls during treatment trials, but recovered in seven trials after discontinuing treatment. Rats given ECS at 1, 5, or 30-minute intervals did not differ from the two-hour group during treatment trials, but required more than 20 trials to recover, and showed marked stereotypy of error behavior. Total maze scores to criterion were a function of the trial-ECS interval. This interval appeared to govern the duration, rather than the magnitude, of the ECS effect on maze behavior. A lasting trace disorganization seems indicated.

2. "Punishing" leg shocks at one- and five-minute intervals had no effects on maze behavior comparable to those of ECS.

3. Anesthetization with intraperitoneal sodium pentothal, injected one minute after each treatment trial, slows maze acquisition during treatment trials (time and error scores). Ten recovery trials are required. One control group was injected with water one minute after each treatment trial, a second was anesthetized at a 30-minute interval, and a third received no injections. Anesthetization appears to slow learning by interrupting trace consolidation after each trial. While ECS should have the same effect, the ECS effect seems to be more permanent. When administered before consolidation is complete, ECS probably acts to disorganize retroactively the consolidating trace.

Slides.

9:25. The effect of conventional electroconvulsive shock (ECS) vs. "Brief Stimulus Therapy" (BST) on learning, nest building, and activity in albino rats. RICHARD F. DOCTER, *Stanford University.*

Tonic-clonic convulsions are induced in albino rats using two forms of electrical stimulation: 60-cycle alternating current (ECS), and "Brief Stimulus

Therapy" (BST), which consists of a succession of unidirectional square wave pulses. BST requires much less current than does ECS. The main question is: Are the effects of electroconvulsive stimulation dependent in part upon the characteristics of the stimulus? In the learning study three matched groups (BST, ECS, control) are retested for proficiency on a 13-unit Stone water maze during concurrent electro-shock and at various intervals following cessation of seizures. Highly significant differences are shown in rate of relearning during shock, the BST group demonstrating superiority over ECS subjects. On cessation of shock, BST animals regain maze mastery more rapidly than the ECS group. Seizures for the two-shock groups appear identical and photographic studies give further evidence of similarity of convulsive patterns.

The nest-building study also yields differential results for nest ratings made during concurrent shock. Again the BST group is significantly superior to the ECS; both shock groups were inferior to the controls. On cessation of shock, both seizure groups improve rapidly, and within 72 hours they are approximately equivalent to the controls.

BST animals consistently average more revolutions in activity wheels than ECS rats both during and after shock periods; however, these differences are not statistically significant. Recovery rates, again favoring BST, are significantly different for the two groups.

The results give added weight to the clinical claims of diminished "harmful side-effects" using the BST technique. Although patterns and density of current distribution may account for the differences, the author favors a theory based on differential intensity of convulsions. The popular notion that once a convulsion is set off, the seizure will run a given course which is entirely independent of the stimulus, should at least be questioned.

Slides.

Division 5. Problem Solving

8:40-9:40. California Room, Sheraton Palace

JOHN T. WILSON, Chairman

8:40. A procedure for developing experimental criteria for use in the analysis of problem-solving behavior. GLENN L. BRYAN, NICHOLAS A. BOND, JR., AND HAROLD R. LAPORTE, JR., *University of Southern California*.

PROBLEM: Analysis of electronics trouble-shooting behavior requires the development of a criterion of trouble-shooting proficiency which is superior to available measures. This paper describes and evaluates an experimental procedure used to produce a

more ultimate criterion of electronics trouble-shooting proficiency.

PROCEDURE: Four highly-qualified subject-matter experts examined 10 sets of 45 detailed sequential accounts of the observable activities of experienced trouble-shooters. These records were automatically recorded as a part of a synthetic performance test. Each judge independently assigned the records in each set to five categories of a forced-normal distribution of "trouble-shooting goodness." The judgments were accomplished under rigorous experimental controls. Opportunities for disagreements among judges were maximized.

ANALYSIS: Analysis of variance techniques were used to determine the extent to which the judges agreed within each set of records and in terms of total assignment of all records.

RESULTS: The extent of agreement among judges was very high. The implications of these findings to problems associated with the development of scoring procedures are discussed.

Slides.

9:00. A technique for the study of problem solving.

HORACIO J. A. RIMOLDI, *University of Chicago*.

This paper describes a technique for the study of problem solving which explores the number, type, and sequence of questions asked by a subject in solving a problem. The main purpose is to analyze the process of thinking rather than its end product as indicated by the final answer.

It is assumed that the same answer to a problem may be the final outcome of different mental processes and that these processes may be appraised by studying how the information asked, in order to solve the problem, is used and evaluated by the subject. The subject is requested to solve a given problem by asking questions that he judges necessary for its solution. Each question is written on a separate numbered card—item—and the corresponding answer is given on the back of each card. The examiner records the questions asked and their order.

Several medical diagnostic and chemical problems have been, thus far, prepared. The technique can be used in a variety of fields.

Performance may be evaluated in terms of a criterion group rather than in reference to the average results for the whole group.

Several properties of the items have been defined: (a) utility index, based on the frequency with which a given item has been selected, (b) median value, which indicates where an item is most likely to be selected and (c) dispersion, which indicates how consistently a card is selected at a specified moment during the examination.

The test can be scored in terms of the agreement between the subject and a criterion sequence and in terms of the amount of information requested to solve the problem.

The results obtained by applying the technique to a group of physicians will be discussed.

9:20. Sequential observation of complex reasoning.

E. R. JOHN AND HORACIO J. A. RIMOLDI, *University of Chicago*.

A technique for the study of the problem-solving process has been described by one of the authors. This technique has thus far been used to study the solution of problems in chemistry and clinical diagnosis. It permits observation of the problem-solving process as a sequence of behavioral elements.

We distinguish two classes of processes: (1) those in which the information content of each element in the sequence is invariant, and (2) those in which the information content of each element is dependent on the sequence as a whole.

This study describes an electromechanical device by means of which Class 2 processes can be studied in less specialty-bound situations. The device consists of a set of elements arranged in a network. Relationships among the elements constitute the network, and are indicated by a diagram on a panel which mounts an array of lights representing the state of the elements. Any relationships or operations which can be expressed in symbolic logic can be established in the net. A switchboard permits about 2^{512} networks to be established, and the logical complexity of each network can be precisely evaluated.

The subject must achieve a specified output from the network by some combination or sequence of inputs which he must determine. To ascertain the necessary input, the logical relations in the net must be analyzed by activating the elements by means of push buttons and observing the consequences.

By analyzing the order and nature of "questions" asked of the machine by subjects, indices of logical efficiency, rate of acquisition of information, rate of evaluation of information, redundancy can be measured. Characteristic modes of performance have been observed and will be discussed.

Division 7. Response Processes

8:40-10:40. Room 220, St. Francis

DALE B. HARRIS, Chairman

8:40. An investigation into the development of cerebral laterality for handedness, language, and other symbolic processes. F. A. QUADFASEL AND H. GOODGLASS, *Boston VA Hospital*.

Lateral specialization is known to develop in the

cerebral hemispheres for language and other symbolic processes, as well as for hand preference. Until recently, the notion of a major or dominant hemisphere which controlled both handedness and language was generally accepted. Other functions were attributed to the "minor hemisphere." Recently accumulated evidence casts doubt on the theory that hand preference indicates or determines language dominance in the hemisphere opposite the preferred hand.

Cerebral laterality for language cannot be studied in the normally functioning brain, as it becomes apparent only on unilateral brain injury. In the present study, 123 cases (13 original and 110 from the literature) were found in which injury to the language areas of either hemisphere was reported in left-handers. It was found that (1) 53 per cent showed language disturbance to be linked to left-sided rather than right cerebral injuries, contrary to the classical theory. (2) Aphasia in left-handers was usually milder but also more frequent with lesions of either hemisphere than in right-handers. This is interpreted as indicating that left-handedness usually connotes a lesser degree of lateral specialization of language function in the brain.

A satisfactory theory of how cerebral laterality develops must deal not only with the findings just described but with the following: (1) About 95 per cent of the population develops right-handedness and about 98 per cent develops left cerebral laterality for speech. (2) Either cerebral hemisphere can function alone for language if the other is severely damaged early in life. (3) In children, aphasia from right cerebral injuries is less uncommon than in adults and it is usually transitory, regardless of which side of the brain is involved.

8:55. Emotional responsiveness in cerebral-palsied children: A test of Phelps' hypotheses. NORMAN GARMEZY, *Duke University and North Carolina Cerebral Palsy Hospital*.

PROBLEM: Wide acceptance has been accorded the formulations of Winthrop Phelps regarding the specificity of love, fear, and anger responses in cerebral-palsied children as a function of type of motor involvement (i.e., spastic, athetoid, etc.). For example, Phelps contends that the spastic patient shows reclusiveness and an increased fear reaction as a consequence of the discomfort induced by his reflex spastic contractile response. Similar types of predictions of the emotional responsiveness of the athetoid are made. The present study was designed to test Phelps' hypotheses.

PROCEDURE: A five-point graphic rating scale was used to rate 37 cerebral-palsied children who were inpatients at a residential hospital. The children ranged

in age from three to thirteen; 26 children were diagnosed spastic, 11 were athetoid. The raters were nine professional hospital staff members and included physical and occupational therapists, nurses, social worker and psychologist. The rating scale consisted of behavioral descriptions of areas relevant to Phelps' hypotheses such as reactions to frustration and fear-evoking situations, socialization and emotional responsiveness to peers, staff, and parents. "Filler" items were designed to disguise the purpose of the ratings. The behavior descriptions within each dimension were designed to coincide with Phelps' predictions.

RESULTS: Analysis of the ratings assigned to the spastic and athetoid children by any and all raters failed to confirm Phelps. A subsequent study of 11 new admissions (all spastic) to the hospital supported the previous findings. A control group of nonhandicapped school children (matched for sex and age), who had been rated by their teachers on the same scale, showed behavior patterns similar to those reported for the handicapped subjects.

CONCLUSIONS: Phelps' hypotheses are not confirmed. The role of more significant factors (e.g., severity rather than type of disability) influencing the emotional responsiveness of cerebral-palsied children will be discussed.

This work was supported, in part, by a grant from the Durham Cerebral Palsy Foundation and the United Cerebral Palsy Associations.

Slides.

9:10. Evidence for the validity of the children's form of the Rosenzweig Picture-Frustration Study.

EUGENE E. LEVITT AND WILLIAM H. LYLE, JR., *Child Welfare Research Station, State University of Iowa*.

Two groups of 5th grade children were selected from the tails of the distribution of scores on the Problem Situations Test (PST), a verbal measure of punitiveness in children, which is significantly related to authoritarianism, parental disciplinary methods, and ability to withhold judgment of others. The children's form of the Picture-Frustration Study was administered to these 52 subjects. The Highs on the PST had a mean E (extrapunitiveness) frequency of 11.60 compared with 8.82 for the Lows ($F = 7.83$, $p = <.01$). The Lows had a mean I (intropunitiveness) frequency of 6.54 compared with 5.42 for the Highs ($F = 4.74$, $p = <.05$). The mean frequency of E-D (ego-defensiveness) for the Highs was 13.35, for the Lows, 11.64 (variances not homogeneous, $t = 2.23$, $p = <.05$). Need-persistence (N-P) means were 8.05 for the Lows, 6.56 for the Highs ($t = 2.07$, $p = .05$).

Thus children who were highly punitive on the

PST were higher in extrapunitiveness and lower in intropunitiveness than those who scored low on the PST. The Highs were also more ego-defensive and less need-persistent. These findings are in expected directions, and reflect favorably on the validity of the children's form of the P-F.

Differences between the two groups and Rosenzweig's normative group were also computed. The Highs had a higher mean E, lower I, and a higher O-D (obstacle-dominance) than the normative group. The Lows had a higher mean M (impunitiveness), a lower E-D, and a higher N-P. These results also appear to indicate that the P-F is a valid instrument.

For the Lows I and M were significantly related to IQ ($r's = .54$ and $-.55$). None of the correlations with IQ was significant for the Highs. The average r between I and IQ for the two groups was .41, $p = <.01$. These data suggest that the P-F is not entirely independent of intelligence.

9:25. Discussion.

WILLIAM E. MARTIN, *Discussant*

9:40. Predictive power of a projective and self-report test of dependency. ARNOLD MEADOW AND MARCIA SHAFFER, *University of Buffalo*.

PROBLEM: Recent reports of low predictive validity of judgments based on projective tests suggested an experiment designed to compare the predictive power of a "projective" and "self-report" test of personality. Specific hypothesis tested was that a projective test of dependency would correlate more highly with ratings of dependency than a self-report test.

SUBJECTS: 160 pupils from 5th through 9th grades of a Lancaster, N. Y., Public School.

METHOD: Two preliminary forms of a questionnaire were devised, comprising a series of items selected to reflect dependency feelings. The first form was prefaced by instructions to imagine writing a story about a boy named Dick, and to choose *a* or *b* of a series of statements which would be applicable to Dick; e.g., if Dick had trouble making a map, he'd prefer to (*a*) ask somebody to help him or (*b*) work it out for himself. The second form comprised identical items except that third-person words were changed to first person. An item analysis was made of both forms of the test on the basis of data derived from a preliminary group of subjects. Final forms of the questionnaire were administered to a new experimental group, and teachers' ratings of dependency obtained. Interrater reliability was +.62 for the two teachers. Test-retest reliability was +.64 for the self-report and +.70 for the projective form.

RESULTS: Out of five correlations between teachers' rank order ratings of dependency (for five separate

classes) and the self-report questionnaire, none was significant. Between the projective form and teachers' ratings, two out of five were significant. ($R = +.32$ and $+.42$. $p < .05$.)

The data suggest that a projective test has greater validity than a self-rating test for the type of variable and age-group utilized in the present body.

Slides.

9:55. Levels of aspiration in preschool children.

HARRY LEVIN, *Harvard University*, AND PAULINE S. SEARS, *Stanford University*.

This is a report on an experimental procedure to measure young children's level of aspiration behavior and the investigation of the consistency of such behavior.

SUBJECTS: 19 four- and five-year-old children.

PROCEDURE: The following six tasks (three motor and three intellective) were devised: (a) jumping for balls suspended from ceiling; (b) reproducing designs with parquetry blocks; (c) pulling up weights; (d) matching designs; (e) broad jump; (f) remembering groups of objects after brief exposure. Each task had five levels of difficulty and the equipment at a given level of difficulty in each of the tasks was painted the same color, so that the children could transfer from task to task the knowledge that red was always the most difficult level, green the easiest, etc. The children were given six trials on each task. The level (color) the subjects chose, their success or failure on each trial, and their comments were recorded. Each child was observed in two sessions, separated by several days.

RESULTS: 1. There is a significant mean shift of color choices toward the easier end of the series in the second experimental session; that is, choices change in the direction of ensuring more frequent success. 2. Children are consistent in the proportion of easy and difficult levels they choose in each session. The intersession correlation in the proportion of choices at the two easiest levels combined is .55 and at the two hardest levels is .45. 3. The nature of the children's choices following success is consistent from session to session. The intersession correlation of the "per cent of choices to a more difficult level after success" is .50; of "per cent of choices down" is .65; and of "per cent of choices at the same level" is .30. 4. There is no session-to-session consistency in the children's choice of level of difficulty following failure.

Slides.

10:10. Acquired reinforcement in preschool children. SIDNEY W. BIJOU, *University of Washington, Seattle*.

PROBLEM: The concept of acquired reinforcement plays a central role in most dynamic formulations of child behavior and development. The research literature indicates that evidence for the concept is based primarily on findings from animal studies. Applicability of the term requires systematic evaluation with humans.

The purpose of this investigation is to determine whether auditory cues presented during instrumental conditioning training have acquired reinforcement properties. The criterion is prolonged extinction.

SUBJECTS: 18 nursery school children, 10 boys and 8 girls.

PROCEDURE: *Experiment I.* The children were divided in two groups, matched for age. All were given a standardized warm-up play period, followed by training involving 30 responses of dropping a ball in a hole to obtain 6 trinkets distributed over a 20 per cent intermittent schedule. A hum of short duration from the trinket-dispensing motor, which accompanied each response, served as an auditory cue.

One group (a) was extinguished with the motor sound accompanying each response, the other (b) without the auditory stimulus.

Experiment II. Experiment II began 7 days after completion of Experiment I. The conditions were the same as Experiment I with two exceptions: (1) A buzzer was synchronized with the dispenser motor sound to make the auditory cue more distinctive. (2) Children who were extinguished with motor hum in Experiment I (a) were extinguished without buzzer, while those that were extinguished without motor hum in Experiment I (b) were extinguished with buzzer.

RESULTS: Training and extinction performances are expressed in cumulative curves. Rate of responding during training was somewhat faster for the buzzer groups. The differences are not statistically reliable, however. The response rate during extinction was faster for the motor hum group (Experiment I) and for the buzzer group (Experiment II). The group showing the greatest resistance to extinction was the buzzer group, being significantly higher than the "without hum" and "without buzzer" groups.

Findings are compared with data from this research program and with those in the literature, and implications are discussed.

Slides.

10:25. Discussion.

Division 14. Selection Studies

8:40-9:40. Franciscan Room, Sir Francis Drake

C. H. LAWSHE, Chairman

8:40. Equivalence of forms of the Wonderlic Personnel Test: A reliability study. HERBERT B. WEAVER, *University of Hawaii*, AND C. A. BONEAU, *Duke University*.

PROBLEM: Examination of the records of nearly 300 cases in an industrial concern showed that Form A of the Wonderlic Personnel Test was yielding higher scores than Form B. This was confirmed in a preliminary study in which both forms were given in counterbalanced order to a group of 30 college students. The main part of this study is concerned with the relative difficulty of all 5 forms of the Wonderlic, which are published as equivalent and interchangeable in respect to difficulty.

SUBJECTS: Seventy college students.

PROCEDURE: All five forms were administered to each subject in counterbalanced order. Analysis of variance and the *t* test were employed to test differences between means of forms. Interform reliability coefficients were computed where possible.

RESULTS: Of the 10 differences among the 5 forms, 2 were significant at the 2 per cent level, 3 at the 1 per cent level, and 4 at the 0.1 per cent level. The average difference amounts to 4.7 per cent of the total possible score range and in centile units to as much as 20 per cent of the distribution of the published norms. The maximum difference is 10 per cent of the total possible score range, amounting to as much as 37 per cent of the distribution. The differences are thus of very immediate, practical significance when the forms are used as equivalent, since meeting or failing to meet a critical score will in many cases depend on the particular form an applicant chances to be given.

Interform reliability *r*'s suggest the forms differ in reliability as well as in difficulty.

CONCLUSIONS: The Wonderlic forms are not equivalent in difficulty. Separate norms should be constructed for each form or conversion formulas developed. Forms appear also to vary in reliability but further study is needed.

8:55. Claimed and reported use of an industrial aptitude test battery. PHILIP ASH, *Inland Steel Company*.

A widely-advertised aptitude test battery, the Factored Aptitude Series (Industrial Psychology, Inc., publisher) includes in its promotional literature extensive lists of users of the tests. Such a list published in May, 1951, was canvassed in 1954 to determine: (a) how valid a guide it might be to actual extent of use and (b) what experience, with what kinds of occupations, bona fide users had with the battery.

Questionnaires were mailed to 177 organizations

listed as users; 91 responses were received. Of these, 45 reported continued use of part or all the battery, 12 reported that they had discontinued use, and 34 that they had not used the battery at all for selection, promotion, or related purposes.

These respondents were checked against a May, 1954, advertising broadside. Twenty-five were listed therein, including 21 current users, one that had discontinued use, and 3 that had not used the battery.

Of the 34 nonusers, 11 did not know, or did not offer an explanation, for their inclusion on the 1951 list, 11 reported that they had only ordered a specimen set, 3 that they used the test in psychology class demonstrations once or more times. The remainder implied miscellaneous other reasons for being included.

Among the 57 respondents who reported current or previous use of part or all of the battery, 22 reported at least some validation study against job performance criteria. The remainder reported that they had not attempted any "formal validation." Analyses were also made of length of time of use, number of cases tested annually, types of jobs for which it was used and types of use (selection, promotion), and variations from standard use.

The implications of these findings for industrial personnel-testing policies and practices will be discussed.

9:10. Levels of generality and inference in employee selection. JAMES B. WINKER, *Victor Adding Machine Company*.

The various methods and techniques used in the selection and placement of employees can be related to each other and to the goal of optimum placement by considering the levels of generality and inference used in describing behavior. The selection process involves describing the job, setting up qualifications desired in the employee, assessing behavior and limitations to behavior, predicting behavior on the job, and measuring actual behavior on the job. Assessing behavior involves gathering data about individuals, evaluating its accuracy, interpreting, drawing inferences, and estimating the amount of various behaviors. Much of the data is about specific behaviors or actions in quite specific situations. Some information is more general, and is compounded of generalizations about a number of specific behaviors in specific situations which are not actually included in the data obtained. This data about general behaviors can be combined and interpreted to show traits of personality. At a still higher level of generality, these traits can be related to each other in a structure of personality. The assessment at some or at all levels of generality is used to predict behavior in the job environment. The greater the skill of the person in-

terpreting the data, the higher the level of generality that can be employed. The more varied the behaviors to be predicted, the higher the level of generality that must be used in interpreting the data. The level of generality that can be used in describing the job, in setting qualifications, in communicating predicted behavior, and in measuring behavior on the job depends upon the comprehension and training of the supervisor involved as well as upon the skill of the predictor.

9:25. The "Test of Social Perception": A new industrial projective technique for selection and analysis of supervisors and conference leaders.

CHARLES W. NELSON, *Industrial Relations Center, University of Chicago.*

PROBLEM: To develop a test that would portray the individual as he normally sees and adjusts to his leadership role within the industrial organization.

Leadership studies have pointed up the importance of the interaction between the leader and the actual social situation in determining the behavior of the leader. The "Test of Social Perception" adds two new concepts to earlier projective techniques in the selection and analysis of leaders.

First, as contrasted to the unstructured Rorschach blots which primarily draw out ego defense mechanisms, the "Test of Social Perception" has a more structured industrial picture designed to bring out the individual's normal problem-solving pattern in relation to his everyday work situation.

Second, as contrasted with the "Thematic Apperception Test," which has to "second-guess" industrial behavior from stories told about family relationships, the "Test of Social Perception" has based its pictures and rationale on a sociological analysis of our society's more dominant industrial institution which, since Taylor at least, is no longer governed by the kinship system of values.

METHOD: The "Test of Social Perception" consists of a series of pictures that show social crisis situations in familiar settings such as technological breakdown, labor strike, etc. The pictures are designed to include each of four major sources of authority or sanction in the industrial organization: formal line authority; technical staff authority; personal authority of the individual; and the authority of the groups' standards. These act as forces or reality checks on the individual in every on-the-job situation. The supervisor or conference leader is asked to write a story about each of the pictures around the following headings: setting, plot, characters, and outcome.

The drama of the crisis situations stimulates and justifies the individual's writing about the pictures. His stories, therefore, indicate his perceptions, in-

terpretations, and reactions to situations in which he might find himself as a part of his daily routine.

RESULTS: The "Test of Social Perception" has been used in industry as a tool for the selection of conference leaders, for supervisory selection, and in research on the motivation of the Negro worker in the south. It has been administered to over four hundred people. Its accuracy as an instrument for determining a man's capacities, reactions, social adjustment, and operational behavior in industrial situations has been demonstrated in the selection of conference leaders and supervisors. Here it has been compared with a battery of other objective and projective tests, superior's ratings, and clinical follow-up interviews. Case analysis of selected vs. rejected conference leaders and supervisors will be presented to show "Test of Social Perception" protocol and analysis in relation to the selection criterion used.

Division 19. Military Leadership

8:40-9:40. Empire Room, Sir Francis Drake

JOHN L. KENNEDY, Chairman

8:40. Survey of regular army officer opinion on career problems. A. G. BAYROFF AND EMMA BROWN, *Personnel Research Branch, TAGO, Department of the Army.*

PROBLEM: To identify important sources of satisfaction and dissatisfaction of regular army officers and their bearing on intention to remain in the service.

SUBJECTS: Randomly selected officers ($N=3500$), second lieutenant through colonel, were asked to complete a questionnaire anonymously. Results are based on 2,700 (80 per cent) replies received within 7 weeks after mailing.

PROCEDURE: The questionnaire contained 107 attitude items representing career conditions with which officers expressed degree and direction of satisfaction or dissatisfaction. Each officer then selected those conditions he considered had greatest influence in his intention. Career problems identified on the basis of officer selections will be integrated with results from related studies: career attitudes not selected as most important vs. intention; attitudes vs. effectiveness; attitudes vs. personal, experience, and expectation factors.

RESULTS: Career security was considered an incentive to remain by more officers (54 per cent) than any other career feature. However, 9 per cent considered it one of the greatest deficiencies. Retirement pay is also an important attraction (33 per cent). Also important as an incentive was a feeling of service; more officers intending to remain considered it an attraction than those intending to resign (38 per cent vs. 15 per cent).

Officers staying in, as well as officers intending to resign, expressed dissatisfaction with pay. However, officers intending to continue were more concerned with pay as meeting living costs than those intending to resign (49 per cent vs. 32 per cent). Those intending to resign were more concerned with military pay compared to civilian pay than those intending to continue (35 per cent vs. 8 per cent). Officers intending to continue were more concerned with caliber of NCO's and army traditions and customs than were those intending to resign. Officers intending to resign were more concerned with promotion problems than were those intending to continue.

8:55. Predicting success in Officer Candidate School with an assessment program, ROBERT V. KATTER, AND MILTON G. HOLMEN, *Human Research Unit No. 2, Continental Army Command*. (Sponsor, Launor F. Carter)

Could an operationally feasible assessment program using situational tests produce useful predictions of an Officer Candidate School pass-fail criterion?

Subjects were a select group of officer candidate applicants who had met present screening requirements. The preassessment screening requirements include high school graduation or equivalent, appropriately high scores on biographical information blank, Army general classification battery, special officer candidate intelligence test, and recommendation forms filled out by superior officers.

Subjects received a two-week assessment program and were then sent on to Officer Candidate schools. Assessment results were kept secret from subjects, school personnel, and personnel operating the officer candidate selection machinery. Follow-up data, including graduation, failure, and resignation categories, were obtained for a total of 201 subjects from three schools.

The program was operated with a minimum of professional psychological supervision, by recently commissioned OCS graduates. Instructions and procedures for the program were contained in a manual issued to this personnel.

Assesseees received scores from a representative battery of paper and pencil inventories, descriptive ratings made by both assessment officers and the other assesseees, prediction of OCS success made by both these groups, and situational tests patterned after OCS activity, rated by assessment officers.

The averaged biserial correlation for the highest correlating one third of the variables in each classification is presented below: peer ranking prediction .58, assessment staff prediction .55, general characteristics rating .54, peer adjective check list agreement scores .48, situational rating .45, peer descrip-

tive ratings .39, officer interview ratings .25, and paper and pencil personality inventories .12.

Results are markedly useful. Differential powers exhibited suggest a formula for achieving useful predictions of practical criteria: (a) analysis of criterion, identifying critical requirements, (b) construction of appropriate analogous situations, (c) rating personnel acquainted with criterion.

9:10. Leader acceptance of responsibility for group action under conditions of uncertainty and risk.

ROBERT C. ZILLER, *Crew Research Laboratory, AFPTRC, Randolph Field, Texas.*

PROBLEM: Frequently, military groups are confronted with decision-making situations in which either action or inaction involves uncertainty and risk. A decision to act under such conditions may involve greater risk compensated only by a reduction of ambiguity in the psychological field, or the resolution of tension through directed action. It is the purpose of this study to explore the relationship of several leader and group variables to leader action under a model situation of this kind.

SUBJECTS: Thirty-nine B-29 crews comprising about 130 men.

PROCEDURE: Following a brief introduction to the experiment, crew members completed a series of questionnaires which provided the data from which measures of the following independent variables were derived: group attraction and the leader's social conformity, motivation, and authoritarianism as revealed by the F scale. The leaders were then taken to one side and the decision-making situation was described to them verbally.

The critical situation involved a military intelligence exercise which was a renowned phase of the training program in which the crews were participating. In this exercise, crew members attempted to evade "capture" in "enemy" territory for a given period of time. If captured, there was an unknown probability of being interrogated under conditions of extreme physical and psychological discomfort. Under the guise of assisting military intelligence personnel in this training exercise, the leaders were offered a choice of action: (a) they could pursue the normal course of events, in which case it was impossible to estimate what percentage of the crew would escape interrogation or (b) throw a die under the condition that in the event of a number 1, 2, 3, or 4 all captured crew members would be subjected to the intensely distressing interrogation, while the event of a 5 or 6 would permit the crew to escape interrogation.

RESULTS: Leaders who accepted responsibility for group action tended to be relatively unconcerned

about differing from the opinions of the group, scored relatively high on the F Scale, and were generally more highly motivated.

9:25. Prediction of leadership from biographical and physical variables. WALTER A. KLEIGER, CECIL D. JOHNSON, AND LAVERNE K. BURKE, *Personnel Research Branch, The Adjutant General's Office, Department of the Army.*

PROBLEM: Self-description tests, physical proficiency batteries, age-at-entrance, height and weight, individually, have been shown to be valid predictors of West Point cadet leadership ratings. This study was concerned with the most effective combination of these measures for the same purpose.

SUBJECTS: Two random samples of U.S.M.A. cadets of the class of '51 were used. N 's of each sample ranged from 174 to 229.

PROCEDURE: Intercorrelations among scores on the predictor tests, background variables, and leadership ratings were computed separately for the two samples. Keys and weights developed on each sample were applied to the opposite sample to obtain two estimates of the cross-validities of several experimental composites.

RESULTS: In samples 1 and 2, the validity of one self-description instrument was .36; the other instrument had validities of .25 and .26, respectively. The physical proficiency battery validity was .33 and .22. Age-at-entrance correlated .20 and .22. Height and weight were not significantly different from zero and so were excluded from further analysis. The four usable variables above yielded cross-validities of .50 and .48 for the two samples.

CONCLUSIONS: Self-description tests, physical proficiency measures, and age proved sufficiently valid and independent to be combined into a predictor which was more valid than any predictor taken singly. This was true even though the physical proficiency battery had considerably lower validity in this study than for other classes and criteria. For this group and criterion, height and weight were not of value. Reasons for this failure and for the lower validity of the physical proficiency battery will be discussed.

Division 3. Physiological Psychology IV

9:50-10:50. Room 2127, Sheraton Palace

HANS-LUKAS TEUBER, Chairman

9:50. A test of the effect of methedrin upon learning in the white rat. S. NEIDITCH AND G. H. FRANK, *Florida State University.*

PROBLEM: Methedrin has been referred to as a stimulator of mental activity. This research attempted to test this assumption by investigating the effects of methedrin upon learning.

SUBJECTS: 30 white rats (15 male, 15 female) average age of 100 days, were used.

PROCEDURE: The research was designed to test the effect of several levels of drug upon male and female rats. A 14-unit multiple-T water maze was used. Drug dosage was determined by individual body weight.

RESULTS: The results were analyzed in terms of drug level (four and a control), sex, and the interaction of these factors.

1. Trial-to-criterion scores: significant F between drug groups only. t identified the significant difference as being between maximum (2.0 miligrams per kilogram of body weight) drug dosage and controls.

2. Error scores: no significant F's.

3. Time scores: no significant F's.

4. Error on first versus second half of maze: chi-square significant: significantly more errors made on first half.

5. Significant relationships were found in the first and second halves of the maze between type of error made (a) blind-alley entrance, (b) cul-de-sac entrance, (c) retracing and drug dosage. On first half: control and 1.5 groups made less *c* error than expected; controls made more *b* error than expected. On second half: controls made more *c* error than expected; 1.0 made less *c* error than expected.

6. Significant relationships were found between drug group and errors in specific cul-de-sacs.

CONCLUSIONS: Significant differences in drug groups were recorded in trial-to-criterion scores only, and not for time or error scores. No differences were found due to sex, either by itself, or when considered in interaction with drug. Further analyses demonstrated differential performance on first half of maze as compared with second; kind of error dependent upon drug, and some consistent error in a particular cul-de-sac as a function of drug dosage. In general, methedrin facilitates learning.

10:05. The effects of drugs and controlled motivational feedback upon two-member team behavior.

RICHARD M. RITTER, *USAF School of Aviation Medicine.* (Sponsor, Robert B. Payne)

PROBLEM: Previous studies have suggested that typically positive effects of dexedrine upon individual performance may be reversed if subjects are required to pool their efforts in a cooperative task performed under certain stressful conditions. The present study attempted to elicit adverse dexedrine effects upon two-member team behavior under conditions of motivational stress and induced cerebral depression.

SUBJECTS: Ninety-six male, Air Force basic trainee volunteers. Subjects were healthy, rested, and experimentally naive.

PROCEDURE: Subjects were randomly paired and trained on a two-hand coordinator modified to allow dual participation. Following training, subjects were randomly assigned to 8 combinations of 4 pharmacological and 2 motivational stress conditions. Pharmacological treatments were placebo, dexedrine, benadryl-hyoscine mixture, and benadryl-hyoscine-dexedrine mixture. Motivational stress was provided by two performance information feedback conditions reflecting different rates of progress toward a goal. Subjects then performed fifty-six 1-min. trials with 15-sec. rest periods between trials and short breaks between blocks of 8 trials. Experimental measures consisted of performance level, task attitudes, and palmar perspiration.

RESULTS AND CONCLUSIONS:

1. There were no significant differences between the general drug means, but a significant interaction of drugs and blocks of practice reflected progressive superiority of dexedrine and placebo groups over the groups involving benadryl-hyoscine. Hypothesized interaction of drug and stressor effects was not found.

2. Attitudes toward the task were improved by dexedrine and benadryl-hyoscine-dexedrine. Subjects attitudes toward their own and their partners' performance were more favorable in the high goal-progress condition.

3. Palmar perspiration was lowest in the two conditions involving hyoscine. It was also lowest on the second of two measurements taken during the test period.

Slides.

10:20. The effect of lysergic acid diethylamide and other drugs upon arithmetic performance. M. E. JARVIK, H. A. ABRAMSON, AND M. W. HIRSCH, *The Mount Sinai Hospital, New York.*

PROBLEM: Lysergic acid diethylamide is a drug which has been shown to produce psychotic-like effects when given in very small amounts. The present investigation was an attempt to study the disruptive effect that this drug might have upon an intellectual task, namely, the accuracy and speed of solving simple arithmetic problems, and to compare its effect with that of other drugs and placebos.

SUBJECTS: Twenty-four subjects between the ages of 21 and 39 with Wechsler-Bellevue IQ's ranging from 109 to 137 were used in these experiments.

PROCEDURE: Subjects were given a printed sheet containing four hundred arithmetic problems, each consisting of three numbers and two operations. Either all three were to be added or two were to be added and the third subtracted. Two comparable forms of each test were given to each subject at each testing. A variety of drugs, including lysergic acid diethylamide, alcohol, secobarbital, amphetamine, methyl-

amphetamine, scopolamine, and a series of ergot alkaloids, was administered to certain of the subjects. In addition to the arithmetic test all subjects received a number of other intellectual and sensory-motor tests.

RESULTS AND CONCLUSIONS: With average effective doses of each drug, lysergic acid diethylamide appeared to be the drug producing the most consistent decrement in arithmetical ability. Increasing doses of this agent produced significantly greater impairment on the arithmetic test. Marked individual differences in susceptibility to the effects of these drugs upon performance of this task were related to initial facility with this arithmetic test as well as to a general sensitivity to LSD and to other drugs as determined by independent measures.

Slides.

10:35. The effect of frequency of intermittent photic stimulation in producing seizures in experimental epilepsy. KENNETH A. KOOI AND EDWARD C. BECK, *Fort Douglas VA Hospital, Salt Lake City, Utah.*

PROBLEM: To study the relationship between frequencies of stroboscopically presented light and the onset and duration of seizure discharges in animals with experimentally induced epileptogenic lesions.

SUBJECTS: 25 adult cats.

PROCEDURE: A satisfactory technique has been developed using small screws with wires attached embedded within the skull to record EEG of cats. Unilateral lesions are made in discrete locations of the visual cortex by injecting 0.2 cc. penicillin in sesame oil with 2 per cent aluminum monostearate through a small burr hole in the skull. Prior to the onset of seizures, animals are curarized and placed on a respirator as a control for anoxia and other variables. Injection of penicillin into the visual cortex initiates slowly repetitive focal spike discharges at the site of the injection within one to two minutes. Subsequently trains of fast spike discharges occur accompanied by convulsive manifestations in the non-curarized preparation. A cycle develops consisting of (a) a period of focal spike activity, (b) a phase with multiple fast spikes which begins locally and spreads to become generalized, and (c) a phase of absence of paroxysmal discharges.

CONCLUSIONS: It has been found that the focal spike activity can be evoked repetitively by rhythmic light stimulation, that the occurrence of the second phase (seizure activity) is influenced by the frequency of the intermittent photic stimulation, the slower frequencies being most effective with a gradual decrement in the direction of the higher frequencies. A detailed analysis of this phenomenon will be presented.

Slides.

Division 5 and Psychometric Society. Individual Differences

9:50-10:50. California Room, Sheraton Palace

LLOYD G. HUMPHREYS, Chairman

(These papers will be mailed to the members of Division 5 and Psychometric Society prior to the meeting. The hour will be devoted to discussion of the issues involved in the papers by the chairman, participants, and audience.)

9:50. Application of discriminant function techniques to problems of psychiatric classification.

W. GRANT DAHLSTROM AND H. J. WAHLER,
*University of North Carolina and VA Center,
Des Moines, Iowa.*

Precise classification of patients is crucial in practical problems of treatment and disposition and in research studies on effects of different treatments, disease processes, or prognostic indicators. To determine the adequacy of variables of the Minnesota Multiphasic Personality Inventory (MMPI) to provide a basis for improving the precision of classification of schizophrenics in the standard psychiatric system, a discriminant function analysis was carried out on 100 VA hospital patients. Fifty cases diagnosed as suffering from some form of schizophrenic psychosis were contrasted with fifty cases representing other forms of psychosis, neurosis, or character disorder. Scores from the total combined group on ten clinical personality scales of the MMPI were normalized and intercorrelated. The inverse of the total group matrix was obtained by Thurstone's technique and the weights for a linear discriminant function computed by Palmer Johnson's method. These weights gave a highly significant ratio of between-group and within-group variances and successfully classified 83 per cent of the original sample when a cutting score derived from the grand means was used. A cross-validation group of 52 schizophrenics and 36 nonschizophrenics was distributed using the same lambda weights after the scale values were given appropriate transformations in the normalized distributions. A highly significant χ^2 value (13.14, 1 df) was obtained and 72 per cent of the cases were correctly classified using the cutting score from the original sample. The possibility of improving this separation by means of a nonlinear function was discussed in the light of a significant χ^2 value (58.09, 55 df) obtained from an application of Federer's test of the homogeneity of the variance-covariance matrices of the original subgroups. The desirability of improving upon this separation in the light of the fallibility of the criterion was also discussed.

10:10. A comparison of identical and fraternal twins on a battery of psychological tests: A preliminary report on the University of Michigan Twin Study. STEVEN G. VANDENBERG, *Institute of Human Biology, University of Michigan.*

During the past two years 45 pairs of identical and 37 pairs of like-sexed fraternal twins of high-school age were examined with an extensive battery of psychological, anthropometric and biochemical tests by a multidisciplinary staff of psychologist, geneticist, biological chemist, and anthropometrist. In this paper some of the results from the psychological tests will be presented for the first time.

Each pair of twins spent two full days on individually administered tests which included WISC subtests, perceptual tasks (Withkin rod and frame, Thurstone: Color-form movie, etc.) and motorskills tests (Rotary Pursuit, Card Sorting, etc.). An 8-hour battery of paper and pencil tests given in the schools included the complete PMA, various personality inventories, projective devices, tests of mechanical comprehension and the Strong Vocational Interest Blank.

The identical twin within-pair variance was compared with the fraternal twin within-pair variance to yield an index h^2 . Significant h^2 values include:

Raven's Progressive Matrices	.44
Primary Mental Abilities—N	.60
Primary Mental Abilities—V	.65
Thurstone Concealed Figures	.67
Thurstone Gestalt Completion	.57
Thurstone Mutilated Words	.50
Heim: AH 4 test of "g"	.56
Card Sorting, right hand	.61
McGill Closure Test	.57
Cattell Paper Mazes	.55
Cattell Jr. Personality Quiz-Factor B	.52
Cattell Jr. Personality Quiz-Factor C	.69
Cattell Jr. Personality Quiz-Factor D	.47
Rotary Pursuit	.52
Finger Dexterity	.71
Card Sorting, left hand	.71

Since the interpretation of h^2 as an index of hereditary control assumes equally similar environments for fraternal and identical twin pairs, the discussion will include an evaluation of data regarding parental attitudes toward and treatment of the twins.

10:30. The relationship between variability and group frequency of responses. DONALD W. FISKE, *University of Chicago, SHIB K. MITRA, Patna University, AND JERRY OSTERWEIL, The Menninger Foundation.*

The frequency with which responses to an item are changed on retest has been shown to have moderate reliability (internal consistency). Is this variability (i.e., the frequency of changes in responses from test to retest) related to the variation in the distribution of the group's responses to an item?

A group of 118 aircrew trainees was given an interest test and a self-descriptive adjective check list twice with a ten-week interval between tests. For each item on these tests, the frequency of changes of response (from one response alternative to another) was determined. A group of 93 students in college extension courses took a sentence completion test twice with a three-week interval. For each item, the number of persons who gave a different response on retest was determined. For both groups, the testing conditions were essentially the same on test and retest.

On each item in each of the three tests, the variation or heterogeneity of the total group's response distribution was calculated. High relationships were consistently found between this heterogeneity index and the frequency of changed responses per item. The correlations were from .60 to .87 on the scales of the interest test, .81 and .95 on two parts of the adjective check list, and .39 to .80 for the sentence completion test.

It is concluded that the greater the variation in the distribution of the responses of a group to an item, the higher the proportion of changed responses on retest. This conclusion is supported by parallel findings in other studies and is in accord with a proposed general conceptualization of response variability. An implication for test construction will be pointed out.

Division 5 and Psychometric Society. Symposium: Some Pattern Analyses of Qualitative Data—Methods and Results

9:50-11:50. Comstock Room, Sheraton Palace

JOSEPH ZUBIN, Chairman

Participants:

CHARLES WRIGLEY. Patterns of voting by U. S. senators.

JAMES K. YARNOLD. Predicting college grades from patterns of achievement in high school.

LOUIS L. McQUITTY. Isolating relationships between predictor and criterion patterns.

DONALD W. STILSON. A comparison of pattern and factor analytic results.

Division 14. Symposium: Sales Organizational Effectiveness

9:50-11:50. Franciscan Room, Sir Francis Drake

ALLYN M. MUNGER, Chairman

Participants: JOSEPH WEITZ, JOHN H. GORSUCH, AND DOUGLAS McGREGOR.

Division 19. Utilization of Limited Aptitude Personnel

9:50-10:50. Empire Room, Sir Francis Drake
ANTHONY C. TUCKER, Chairman

9:50. An evaluation of a basic education program in the army. S. JAMES GOFFARD, *Human Resources Research Office, George Washington University*.

PROBLEM: To evaluate the effects of special pre-basic training upon the potential military usefulness of army inductees of low intellectual and educational level.

SUBJECTS: 2,533 "basic level" men and 1,099 "average trainees" at Fort Leonard Wood, Missouri.

PROCEDURE: Immediately after induction, the basic level men were tested and divided at random into experimental and control groups. The controls were sent directly into Basic Combat Training; the experimentals were given special training for twelve to fifteen days before being sent into Basic Training. Emphasis in the special training curriculum was varied experimentally from almost wholly academic to wholly military.

After eight weeks of Basic Training, experimentals, controls, and average trainees were compared on their attitudes, the changes in their attitudes, their troublesomeness in their training companies, and their military proficiency, both verbal and performance.

RESULTS: Whatever the emphasis in the special training, the experimentals and controls were alike in attitudes, attitude changes, and troublesomeness. The experimentals were consistently more proficient than the controls, but only slightly so. Compared to the basic level men, the average trainees had generally less favorable attitudes, were less troublesome, were much more proficient on the verbal test, but only slightly more proficient in the performance test.

CONCLUSIONS: Special academic or military pre-basic training has, on the average, little effect upon the potential military usefulness of inductees of low intellectual and educational level.

10:05. An evaluation of a training program for limited aptitude airmen. A. CARP AND S. MASTROPAOLO, *Air Force Personnel and Training Research Center*.

PROBLEM: The identification, training, and utilization of low-ability personnel in military service has long been a problem. As manpower requirements increase, the services are required to dig deeper into manpower reserves and to use personnel they would otherwise reject. In the spring of 1952 the Air Force requested

a limited study to determine the effects of two different lengths of basic training as reflected in subsequent performance of low-ability airmen.

SUBJECTS AND PROCEDURES: One thousand airmen whose aptitude indexes on the Airman Classification Battery were Stanine 3 or below were subjects for this study. Five hundred of these airmen were given a 6-week basic training program and 500 a 12-week basic training program. Important differences between 6 and 12 week training syllabi were the elimination of arithmetic and language arts from the short course and the inclusion of 45 hours of instruction in each of these areas in the long course.

RESULTS AND CONCLUSIONS: Prior to training, the two groups were comparable on all pertinent variables. Various measures of ability and performance were obtained at the completion of basic training at the end of six weeks on the job, and at the end of eight months on the job. These measures provide the criteria for evaluating the effects of the two lengths of training. There were no important differences either at the end of basic training, 6 weeks, or 8 months on-the-job in aptitude test scores, achievement test scores or indexes of job performance. Differences were minimal, as well, on language and arithmetic achievement tests.

The prediction of a composite criterion of on-the-job performance from aptitude, achievement, interest, and biographical data yielded essentially negative results. Implications of this study for scholastic-type training of limited aptitude airmen will be discussed.

10:20. Validation of tests of general learning ability designed for enlisted personnel of limited mental ability. MARY A. MORTON, THOMAS J. HOUSTON, LEON G. GOLDSTEIN, AND EDMUND F. FUCHS, *Personnel Research Branch, TAGO, Department of the Army.*

PROBLEM: To determine the value of several learning aptitude tests for predicting success in basic training of Army inductees of limited mental ability.

SUBJECTS: Twenty-two hundred new inductees of limited mental ability (marginals) in basic training at Fort Leonard Wood, Missouri, September, 1953 through June, 1954.

PROCEDURE: One verbal and two nonlanguage Army tests were administered to marginal inductees as they reported for training. The men were then assigned, randomly, to experimental and control groups. Controls began regular basic training immediately. The Experimentals were assigned to a special detachment for 2½ to 3 weeks of special training prior to regular basic training. Controls and Experimentals were administered criterion measures as they completed basic training. The design of this study was set up to per-

mit differential prediction as a function of the presence or absence of special pre-basic training. Since data show no differences in basic training performance between Experimental and Control marginals, evaluation of the tests is confined to their predictive ability for basic training success of marginals in general.

RESULTS: The best over-all predictor of basic training success was the Non-Language Test-2ab with correlations of .18 with basic training ratings, .25 with a performance test of basic training, and .30 with a paper and pencil test of basic training proficiency.

Multiple correlation of the two nonlanguage tests against basic training ratings is .20, against the performance test is .27. The paper and pencil test criterion is best predicted by combining the verbal and the Non-Language Test-2ab: multiple *R*, .45.

CONCLUSIONS: For men of limited mental ability, the Non-Language Test-2ab is the best single predictor of success in basic training as measured in this study. The size of the correlations assumes greater import when it is recognized that prior screening on other tests has made the population of this study very homogeneous.

10:35. Personality factors in illiteracy. JOHN E. RASMUSSEN, *Bureau of Medicine and Surgery, Navy Department.*

Navy recruits who cannot read or write at the fourth-grade level receive up to thirteen weeks of intensive literacy training. Each man also undergoes a series of evaluations at the Neuropsychiatric Unit, both during the course of his literacy training and after he has advanced to regular recruit training. The NP evaluation program has provided the opportunity for collection of considerable data on the reasons for the limited improvement in reading ability which has been noted in military literacy programs. The present data were collected at the U. S. Naval Training Center, Bainbridge, Maryland, on samples of illiterate recruits (*N*'s ranging from 458 to 1,251) drawn primarily from New England and the Middle Atlantic states.

Service illiterates drawn from the above geographical areas have a number of characteristics which set them apart from the typical remedial reading problems encountered in civilian life. There are few visual, auditory, or other physical defects; mental deficiency is not a significant problem; and lack of educational opportunity is of limited significance. However, the latter factor may not hold for the deep south and southwest.

The median civilian school grade achieved by the Bainbridge illiterate population (1951-1954) was the eighth. Only 7.5 per cent had not reached the sixth

grade; 8.6 per cent were high school graduates. Revised Army Beta scores on a sample of the above group ($N=458$) showed a median IQ of 92.7, with 82.2 per cent of the group having IQ's above 80, and only 4.4 per cent below 70.

Within the past two calendar years, 20.1 per cent of the Bainbridge illiterates received discharges for psychiatric reasons prior to completion of recruit training, while the rate for literates was 3.1 per cent. An average of 3.5 per cent of the total recruit population was illiterate; however, this group contributed from 16 to 24 per cent of all men discharged as psychiatrically unsuitable for service.

The illiteracy seen in the Navy is considered to be quite frequently a symptom of a pronounced character disorder or neurosis. The etiology of the emotional reading disorders seen in the service may be considered under three major headings: (a) Primary emotional blocks to reading; (b) emotional disorders which are the outgrowth of reading disabilities; and (c) disorders which are basically cultural in origin.

Division 1. Symposium: Conceptual Trends

11:00 A.M.-1:00 P.M. Italian Room, St. Francis

RICHARD CRUTCHFIELD, Chairman

Participants:

JOHN P. SEWARD. Learning.

FREDERICK FRICK. Human engineering.

Division 3. Human Problem Solving I

11:00-12:00. Room 2127, Sheraton Palace

LEON FESTINGER, Chairman

11:00. Transfer effects in human problem solving.

NICHOLAS A. BOND, JR., *University of Southern California*.

PROBLEM: This research investigated the transfer effects of a prior utilization of an object on subsequent availability of the same object for a different purpose. A crude theory of transfer was formulated which predicted that the influence of the earlier experience would vary, in amount and direction, according to the relative functional novelty of the crucial responses required in the successive situations.

SUBJECTS: 66 male undergraduates.

PROCEDURE: Modified versions of the Duncker box and gimlet problems served as test problems: each test problem could be solved only by using a certain object. Special preproblem situations required the crucial test problem object to be employed for functions dissimilar to that required for the test problem. The preproblem utilizations were designed to vary in functional novelty. Functional novelty of the preproblem and test problem utilizations was esti-

mated by a judgment technique and by an elicitation method.

The preproblem situations and test problems were individually administered to three experimental groups and one control group. Each experimental group had a different preproblem utilization of the crucial test problem objects, while the control group received no such prior experience. All subjects attempted the same test problems. Solution or failure, solution time, and time to "crucial object set" were recorded as measures of performance.

RESULTS: Predicted intergroup differences on the box problem solution times were obtained at the .05 significance level. Differences for the other box problem performance measures and for the gimlet problem were insignificant.

CONCLUSIONS: Validity of the functional novelty theory of transfer depends on the particular problem situation and performance criterion employed. Furthermore, sensitivity to the novelty of the preproblem utilization seems to be organized categorically instead of continuously; this interpretation is substantiated by a partial reanalysis of the experimental data. Slides.

11:15. Learning sets in human concept formation.

MARY F. CALLANTINE AND J. M. WARREN, *University of Oregon*.

The purpose of this experiment was to compare concept formation and transfer under single- and multiple- problem conditions. Six groups of 20 subjects sorted cards according to four concepts: (a) both color and form same, (b) color different but form same, (c) color same but form different, and, (d) both color and form different.

Five different packs of 80 cards each were constructed for the training portion for presentation to the following experimental groups: Group A: 20 different stimulus patterns per concept; Group B: 10 different stimulus patterns per concept, each pattern being duplicated; Group C: four different stimulus patterns per concept, each repeated five times; Group D: two different patterns per concept, each repeated 10 times; Group E: one pattern per concept, repeated 20 times.

Group F sorted only that pack of cards assigned to the transfer problem. The transfer pack on which all groups were tested had 20 different stimulus patterns per concept. These patterns differed from the training stimuli in both color and form.

1. On the training task Group E made significantly fewer errors than all other groups. Group D made significantly fewer errors than Groups A, B, and C. The performance of Group A was significantly inferior to the other four groups.

2. On the transfer portion of the experiment, Group A's performance was significantly superior to the other five groups: B, C, D, E, and F. The performance of Group B was significantly superior to the performance of Group C, and Group C's performance was, in turn, superior to D, E, and F. The difference between the mean errors on Groups D and E was not significant, but both of these groups made significantly fewer errors than Group F.

Thus, the results indicate that original learning is retarded but positive transfer effects are enhanced in proportion to the number of different examples of each concept provided in the training series. These findings corroborate predictions derived from Harlow's description of learning sets in monkeys.
Slides.

11:30. Problem solving in multiple-goal situations.

SCARVIA B. ANDERSON, *Naval Research Laboratory*.

PROBLEM: Analysis of situations designated "problem-solving situations" indicates experimenters may focus attention upon manipulation of characteristics of (a) given information or material, (b) goal, (c) means of proceeding from one to the other, (d) persons to whom the situation is a problem, and/or (e) environment in which the problem is faced. The present experiment centers about the goal—the aspect of problem-solving situations most neglected in previous research. Specifically, the experiment was designed to study the relationship between number of different plausible goals stated for subject and progress, efficiency, accuracy, activity level, and "tactics" in problem solving. Number of goals was varied from one through four.

SUBJECTS: 32 navy enlisted men, homogeneous with respect to GCT scores.

PROCEDURE: Calculus of propositions problems (advantageous because they admit manipulation of goals and discrimination of subjects' problem-solving steps) were used. The four experimental problems consisted of three premises and from one to four stated goals. Although in the case of multiple goals any goal appeared plausible to subject, only one was actually deducible (by a set of six sequentially dependent steps). Following training in the rules of the calculus task and work on 10 practice problems, each subject participated in four experimental sessions lasting a maximum of 30 min. each. A randomized block design was used with one replication.

RESULTS: 1. Progress toward solution (in terms of relevant steps) and amount of "information" provided by successive relevant steps decreases as number of goals increases. 2. Accuracy (in terms of errors) is not related to number of goals. 3. Efficiency (in

terms of relevant/irrelevant steps and redundant activity) decreases as number of goals increases. 4. Activity level (number of responses per min.) decreases as number of goals increases. 5. Problem-solving "tactics" vary as a function of number of goals; e.g., subjects faced with four goals tend to bring more "outside" material into problems.
Slides.

11:45. Specific regression under a nonrelated stress situation. RICHARD P. BARTHOL AND NANI D. KU, *The Pennsylvania State University*.

PROBLEM: Several studies have indicated that frustration may lead to regression. It is postulated that frustration, fatigue, and conflict are special cases of stress. The general hypothesis is that under stress an organism will respond with the behavior, appropriate to the situation, that was learned first. The specific hypothesis tested was that if an organism has learned two alternate responses to a stimulus and is placed under stress unrelated to the behavior being observed, it will respond to the stimulus with the earlier learned behavior pattern.

PROCEDURE: (a) Eighteen students were trained to tie a bowline knot by two methods; (b) they were placed in a stressful situation; (c) they were then asked to tie a knot. According to the hypothesis the subjects would tie a bowline by the method they learned first. Half of the subjects were taught method A first, then method B; the other half were taught method B first, then method A. As a control, all subjects tied a knot under nonstressful circumstances.

In the stress situation the subjects took a difficult intelligence test (the Lepley Synonym Vocabulary Test) late at night under overvigorous conditions with the understanding that the test was simple. At the conclusion of the test each subject was asked to tie a knot.

RESULTS: The experiment was initially conducted with eight subjects, then replicated with ten new subjects. The hypothesis was supported: all but two of the subjects tied a bowline by the method they had learned first. The separate results were significant at the .01 and .055 level; the combined results were significant at the .001 level. In the control study the subjects showed no tendency to tie the knot by the first learned method.

Theoretical and applied implications are discussed.

Division 5 and Psychometric Society. Intellectual Processes

11:00-12:00. California Room, Sheraton Palace

J. P. GUILFORD, Chairman

11:00. Fechner's Law and Central Tendency as determinants of response gradients. LYLE V. JONES AND JACOB L. GEWIRTZ, *University of Chicago*.

PROBLEM: To determine effects of Fechner's Law and Central Tendency upon gradients of response strength (frequency of voluntary motor responses) to stimuli along a dimension of visual angle.

PROCEDURE: Four experimental groups were employed, each of 10 adult subjects. Subjects were presented with two tasks: (a) training to respond to a zero angle stimulus, followed by testing for response to the training stimulus and to 10 stimuli symmetrically positioned around zero at intervals of 1 min. 36 sec. (in the center stimulus range); and (b) training to respond to a nonzero angle stimulus, either a positive angle (in the right stimulus range) or a negative angle (in the left stimulus range) markedly different from zero, followed by testing for response to the training stimulus and to 10 stimuli symmetrically positioned around it at intervals of 4 min. 48 sec. The four groups differed with respect to: the order of the tasks presented (the center stimulus range presented either first or second); the position of the off-center training stimulus.

RESULTS: 1. As is expected from Fechner's Law, response gradients for subjects initially presented stimuli in the center range exhibited steeper slopes than those for subjects initially presented an off-center stimulus range ($p < .001$). 2. The difference in skewness between the individual response curves for subject's initially presented stimuli in the left and subject's initially presented stimuli in the right range was in the direction expected under Fechner's Law. 3. As is expected from the principle of Central Tendency, it was found that the response gradients of individual subjects, both in the center and off-center stimulus ranges, were displaced significantly in the direction of their previous experiences with the stimulus dimension ($p < .05$, $p < .001$). 4. On the basis of the analysis of differences among the five cycles of 11 trials each, it appeared unlikely that differences in performance from cycle to cycle could have accounted for the obtained Central Tendency results.

CONCLUSIONS: There are discussed the implications of these findings to the study of stimulus generalization and discrimination phenomena.

Slides.

11:20. Judgment of authority from recorded voices: A scaling problem. E. L. HOFFMAN, J. H. ROHRER, AND J. H. L. ROACH, *Urban Life Research Institute, Tulane University*.

PROBLEM: The problem was to ascertain whether judgments of voice recordings can be scaled along a

dimension of authoritarianism, and whether differences exist between judgments of two samples of spoken material.

SUBJECTS: One hundred male students enrolled in undergraduate courses in psychology served as judges of recorded voices of nine selected male undergraduate and graduate students.

PROCEDURE: The voices of nine individuals were recorded on high fidelity tape as they repeated a series of four numbers and an imperative sentence. Long-playing phonograph records presenting the voices juxtaposed in pairs were prepared using the number material from the tape recording. All 36 possible pairs were formed from the nine voice samples and presented on the phonograph record in a random order. The same procedures and random order were employed in preparing a set of records for the sentence material.

One hundred subjects listened to these recordings and indicated which member of each pair spoke with more authority. These judgments, obtained by the method of paired comparisons, were analyzed using Thurstone's Case III of the law of comparative judgment. Mosteller's test for goodness of fit was used to evaluate the scaling.

RESULTS: A ranking of the nine voices was achieved independently for the number and the sentence material. The rank difference coefficient of correlation between the scales was $+.783$, resulting in a rejection of the hypothesis of independence for the scales at the one per cent level of significance.

The scale values, ranging from 0-3.065 and 0-3.377 for the number and sentence data, respectively, were not adequate accurately to reproduce the original proportions of judgments as indicated by Mosteller's test.

CONCLUSIONS: Judgments of authority are consistent for voices repeating a series of numbers and the same voices speaking an imperative sentence. A unidimensional basis for these judgments does not exist, however.

11:40. Formal and concrete thought processes. JOHN A. KEATS, *Educational Testing Service and Princeton University*. (Sponsor, Harold Gulliksen)

Certain aspects of Piaget's theory of intelligence have been expressed in a form which can be examined by quantitative methods. Special items were prepared for group administration and pretested using a sample of 100 Grade VI children (approximately 11 years of age). These items were revised on the basis of this pretesting and further items prepared on a similar basis. These items were administered to approximately 1,300 subjects covering Grades IV, VI,

VII, VIII, and X, corresponding approximately to ages 9, 11, 12, 13, and 15.

Tests of significance developed by Wilks were used as a partial test of the theory as expressed. Further investigation was made by examining exceptional cases. The results of this analysis indicate that the theory as expressed for the purposes of this study can be demonstrated using objective test methods and large groups in at least some content areas. There is also some evidence which suggests that formal operations can be used to solve problems which are not solved in their concrete form by subjects who have reached their twelfth year.

Division 19. Human Engineering I

11:00-12:00. Empire Room, Sir Francis Drake

PAUL M. FITTS, Chairman

11:00. Minimum allowable dimensions for knobs mounted on concentric shafts. JAMES V. BRADLEY, *Aero Medical Laboratory, Wright-Patterson AFB*, and NORMAN E. STUMP, *Pennsylvania State University*.

PROBLEM: To determine the minimum allowable dimensions for knobs mounted on concentric shafts.

SUBJECTS: 76 male undergraduates.

PROCEDURE: Subjects made a standard setting with the front, middle, or back knob of three concentrically mounted controls. Variables manipulated were: thickness, diameter of operated knob, and diameter difference between operated and adjacent knobs. Measures taken were: reach time, turning time, and inadvertent touching of adjacent knobs. Nine experiments were performed, investigating both unshielded knobs and knobs whose faces were shielded against movement by inadvertent touching. "Blind" operation was also investigated. The smallest diameter used for the operated knob was one inch.

RESULTS: Visually-aided performance, as defined by one or more of the measures taken, frequently suffered under the following conditions (whether the knobs were shielded or not): (a) when diameter difference between adjacent knobs was less than $1\frac{1}{4}$ inches, (b) when front or middle knob thickness was less than $\frac{3}{4}$ inch, (c) when operated knob diameter was 1" or 4" as compared with 2" or 3".

A $\frac{1}{2}$ " gap between middle and back knobs had the same effect upon performance as an extra $\frac{1}{2}$ " of middle knob thickness, when the middle knob was $\frac{1}{2}$ " thick.

Within the range of thicknesses and diameters tested, back knob thickness was an irrelevant variable, and front knob thickness was irrelevant when the middle knob was operated.

"Blind" performance was poor even at a diameter difference of $1\frac{1}{2}$ ".

CONCLUSIONS: When knobs 1" or more in diameter are mounted on concentric shafts, performance will probably suffer when adjacent knobs differ in diameter by less than $1\frac{1}{4}$ " or when either the front or middle knob is less than $\frac{3}{4}$ " thick, whether the knobs are shielded or not. Therefore it will probably be undesirable to mount more than three such knobs on concentric shafts.

11:15. Target designation with small joy-stick type controls. J. DAVID REED, *Rutgers University*.

A pencil-sized lever, fixed at the base and rotating freely in all directions, might well be found practicable for controlling an indicator to designate the position of pips on a radar scope. Such a small lever implies a ratio of hand movement to indicator movement of less than one. Previous research has shown that highest accuracy of designation is achieved with high ratios; i.e., the hand moves much farther than the indicator, but in the interests of developing practical-sized instruments and investigating a basic psychomotor function, it is important to discover the potential for speed and accuracy at low ratios. In a series of experiments relating accuracy of designation to the ratio of hand movement under a variety of conditions, measurements were taken of the time required to position a tiny beam of light over simulated targets of $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{1}{2}$ inches in diameter under various ratios of hand-to-pointer movement: one to 5, 11, 23, and 35. The indicator beam was controlled by a joy-stick lever approximately the size of an automatic pencil and weighing less than two ounces. A total of ten highly trained subjects was used. Each experiment consisted of a balanced sequence of four subjects on 24 trials under each condition. Very stringent accuracy requirements were found to necessitate larger hand-to-indicator movement ratios and take longer, but subjects were quite capable of making precise and rapid settings under favorable conditions at a ratio of 1 to 35. The most effective condition was that of a small braking force for the lever; subjects were fastest and most accurate with the palm supported, less so with elbow supported, still less so with no hand support at all.

Slides.

11:30. A study of the importance of the display-control direction relationship in quickened and unquickened systems. HENRY P. BIRMINGHAM, *Naval Research Laboratory and American University*, FRANKLIN V. TAYLOR, *Naval Research Laboratory*, CHARLES K. TRUEBLOOD, *American University*.

PROBLEM: Many studies have been conducted concerning the importance of observing the population stereo-

type in the design of man-machine control systems. Since some of these studies were in situations where display response is delayed by system dynamics (as in aircraft, for example) a study was run to evaluate the penalty incurred for failing to observe the population stereotype (a) where there are lags between control movement and display response, and (b) where the display is quickened.

SUBJECTS: Six naval enlisted men.

CONDITIONS: The task was one of compensatory tracking. The display was a 5-inch cathode ray tube and the control a 1½-inch knob. System dynamics were provided by an EASE analog computer, and the computer also provided the average error score at the end of each trial of 45 seconds' duration. There were two variables in the experiment: (a) Presence or absence of quickening, and (b) Display control-display direction relationship. Three conditions of direction relationship were used: (a) Normal (a clockwise movement resulted in a right-going movement of the target dot), (b) Reversed, and (c) Cycling (the control-display relation was reversed every 6 seconds during the trial).

RESULTS: The degeneration in performance in the b and c conditions over the a condition was much greater without quickening than in the circumstances where quickening was provided.

CONCLUSIONS: 1. Where there is a "loose" display-control relation, it is very important to adhere to the population-stereotyped direction relation. This confirms other studies. 2. Where there is a "tight" or quickened relation, the population stereotype has much smaller effect on performance. 3. Quickening is a much more effective factor in man-machine system performance than the population stereotype.

11:45. Transfer of training between "quickened" and "unquickened" displays. JAMES G. HOLLAND, AND JEAN B. HENSON, Naval Research Laboratory.

Many conventional ("unquickened") controls provide an acceleration output for a position input. Such controls require the operator to make a counter-movement after his initial response, but before the displayed error reaches zero, in order to avoid overshooting. Birmingham and Taylor have demonstrated that when position and velocity information are added to the display in the proper proportions ("quickened") the operator is no longer required to anticipate the results of previous responses; instead, he has only to make his responses proportional to the displayed error. However, before quickened displays are adopted for existing equipment, it is desirable to ascertain if operators trained on an unquickened display would experience habit interference when forced

to use a quickened display, and vice versa. Since the instantaneous appearance of the signals are alike and only their relation to the man's response varies, much negative transfer might be expected.

PROCEDURE: A two-dimensional compensatory tracking task was employed. The subjects' task was to keep a pip of a cathode ray oscilloscope centered on a hairline by using a spring-restrained joystick. Twelve naval enlisted men served as subjects. Half were trained with the unquickened display and half with the quickened display. These groups were subdivided as to length of training—each subject receiving either 140 or 260 forty-second training trials, after which they were tested with the other display.

RESULTS: Rather than the negative transfer expected from the assumed stimulus-response relationships of the two systems, a slight positive transfer occurred. Accepting the well-established relationship between transfer effect and similarity among stimulus and response elements of two different tasks, these results have implications concerning the psychological nature of the two tasks.

Slides.

WEDNESDAY AFTERNOON, SEPTEMBER 7

International Council of Women Psychologists. Board of Directors II

1:30-6:00. Room 221, Sir Francis Drake

Division 1. Symposium: General Systems Theory and Psychology

1:30-3:30. Italian Room, St. Francis

L. VON BERTALANFFY, Chairman

Participants:

L. VON BERTALANFFY. The principle of equifinality.
FRANZ ALEXANDER. The principle of homeostasis
in physiology and psychology.

RAOUL NAROLL. The principle of allometry in
biology and the social sciences.

Discussant: EGON BRUNSWIK.

Division 3. Human Problem Solving II

1:30-2:30. Room 2127, Sheraton Palace

HARRY F. HARLOW, Chairman

1:30. Test of a theoretical formulation relating a preplanning technique to factors in successful problem solving. ELI SALTZ, JOHN V. MOORE,
AND ARTHUR J. HOEHN, *Training Aids Research
Laboratory, Chanute AFB, Illinois.*

A technique for preplanning was developed to facilitate problem solving in situations where the problem is to determine why a piece of equipment fails to function properly. The preplanning technique was developed with two goals in mind. (a) The first goal: to increase the likelihood that alternative possible causes of the equipment malfunction will be tested should the subjects first choice among possible causes prove to have been erroneous. (b) The second goal: to facilitate the accurate testing of any single possible cause that the subject might wish to investigate. The preplanning technique developed to meet these goals was based on a set of theoretical formulations which the writers previously suggested might be useful for applied problems.

The technique was tested on three problems in the generator phase of an electrical course. Malfunctions were placed in generator equipment and students in the course were given the task of locating the malfunctions. Seventy-two students were instructed in the preplanning technique and were told to use it in solving problems. Seventy-three students were not instructed in the technique; they were told to solve the problems in any way they could.

As was predicted on the bases of the theoretical formulations, more of the students using the preplanning technique solved the problems than did controls. Perhaps of greater theoretical importance, an analysis was made of specific types of responses (i.e., number of check points tested, systematic errors, and repetitive errors). The results for successful men (preplanners vs. controls) and unsuccessful men all supported the predictions made on the basis of the theoretical formulation. The results indicated that the preplanning technique which was developed achieved the two goals set for an improvement of problem solving.

1:45. Problem solution as a function of a task difference. WILBERT S. RAY, *Air Force Personnel and Training Research Center*.

This is a report of an experiment on probability of success in problem solving as related to task differences. Two groups of subjects were presented with forms of a problem which had the same solution, but which differed in the number of kinds of information supplied. The task was to identify two current-carrying bars among seven. Information was provided the subject by directing him to connect four particular bars to a "test kit," which showed a light when the "correct" pair was included among the bars tested. One group received five instances of negative information (i.e., none of the five test kits showed a light). In the other group two kinds of information were supplied by having a positive instance substituted

for one of the negative ones. The negative instances condition demanded that the subject invent and use three hypotheses, while the mixed instances condition required four. The criterion of success was identification of the bars and an acceptable explanation.

The experimental population consisted of male airmen classified as intellectually above the average of the general population. Of the 14 in the negative instances group, five solved the problem successfully, while of the 14 in the mixed instances group, 12 were successful, a difference which reaches the .01 level of confidence.

It is concluded that the two kinds of information, positive and negative, increased the probability of solution as compared with only negative information. It will also be noted that an increase in the number of subject-produced hypotheses was accompanied by an increase in the number of solutions.

Slides.

2:00. A study of verbal and instrumental response hierarchies and their relation to human problem solving. ARTHUR W. STAATS, *University of California at Los Angeles*.

PROBLEM: The status of subjects' response hierarchies to objects involved in the problem was ascertained by having subjects list all the possible uses of the objects. These verbal response hierarchies were related to problem-solving behavior and S-R implications tested.

SUBJECTS: 61 introductory psychology students.

PROCEDURE: A modification of the Maier two-string problem was used. Only a pencil, piece of paper, piece of balsa wood, small screw, and screwdriver were available as tools. Only the screwdriver was useful and had to be tied to one string as a weight to swing it.

Before the problem, subjects took the Taylor Anxiety Scale and Abstract Reasoning test and listed their hierarchies of uses to the above objects. They also listed a hierarchy of responses to the screwdriver after the problem.

RESULTS: The strength of a certain type of response to an object in the verbal hierarchies was gauged from the number of times this type appeared (probability of occurrence) and from the rank of the first response of this type (availability or latency). The correlation between both indices of response strength was significant.

Fifty-five subjects solved the problem within the 10' time limit. Problem solution time was significantly correlated (a) with both indices of strength of type of response to the screwdriver's weight aspect; (b) with abstract reasoning; (c) with the total number of responses given to the screwdriver and also to the

other four tools, however, the correlation with the screwdriver was significantly greater than that with the others. Male subjects did significantly better than females in time to solution. The sexes did not differ significantly in abstract reasoning, but did differ in their response hierarchies in the expected directions.

CONCLUSIONS: The method appears fruitful. Verbal and instrumental hierarchies appear to correspond and S-R expectations of the relation of strength and availability of classes of responses to human problem solving were corroborated. The fact that individual responses to the weight characteristic of the screwdriver (e.g., paperweight, fishing sinker, plumb bob, etc.) were functionally equivalent and could form classes which related to problem solving, suggests the operation of habit families. Of importance in problem solving are the extent of subjects' learning with respect to the objects involved, abstract reasoning ability, and fluency in responding. A sex difference in problem-solving ability, as has elsewhere been found, was exhibited. However, here there was evidence that the variation is due to differences in learning.

2:15. A test of a new theory of thinking. W. A. S. SMITH AND EUGENE H. GALANTER, *University of Pennsylvania*.

PROBLEM: Galanter and Gerstenhaber have proffered a new theory of thinking which states as a major hypothesis that "recursive" or insightful behavior will be employed by human subjects when the cost of "stochastic" or trial-and-error behavior is high. This experiment is designed to test this hypothesis. For this theory a problem is defined as an environmental situation or mechanism plus a "pay-off function."

The mechanism employed was a binary sequence generator producing zero's 75 per cent of the time at random and one's the remaining 25 per cent of the time. It has been shown that the usual asymptotic achievement of individuals in this situation is 62.8 per cent, although the maximum possible achievement is 75 per cent. Galanter and Gerstenhaber characterize an achievement of 75 per cent as constituting an insightful solution. Such a solution will be obtained, according to their hypothesis, only if the cost of stochastic behavior is high. In the present experiment this was accomplished by manipulating the pay-off function.

SUBJECTS: The subjects were 30 undergraduate men and women of the University of Pennsylvania.

PROCEDURE: The subjects were assigned randomly to one of the two experimental groups. Group I was given the situation described above with a pay-off function indicating a high cost for trial-and-error behavior. Group II received the same situation with

a pay-off function indicating a low cost for trial and error in the achievable range.

RESULTS: The asymptotic achievement was obtained for all individuals in each of the two groups. For Group I the median value of this achievement was 70.4 per cent while that for Group II was 62.5 per cent.

CONCLUSIONS: The results are interpreted as confirming the hypothesis that recursive or insightful behavior will be employed by human subjects when the cost of stochastic or trial-and-error behavior is high. Slides.

Division 5 and Psychometric Society. Discriminatory Judgments

1:30-2:30. California Room, Sheraton Palace

ERIC F. GARDNER, Chairman

1:30. The discriminant dispersion as a function of complexity of judgment. HAROLD GULLIKSEN, *Educational Testing Service and Princeton University*.

PROBLEM: To investigate the change in the magnitude of the discriminant dispersion, with variation in the complexity of judgment.

PROCEDURE: The material used was from a menu. Three illustrative items are shown.

Item

A —3 Loin Lamb Chop (u)
A —3 Sirloin Steak (u)

—3 Roast Rib of Prime Beef and Loin Lamb Chop
B (c)

—2 Roast Loin of Pork and Sirloin Steak (c)

C —2 Sirloin Steak (u)
C —2 Boiled Smoked Beef Tongue and Loin Lamb Chop (c)

Two degrees of stimulus complexity were used—the "unitary" stimulus (designated u); and the "composite" stimulus (designated c). Item A illustrates "unitary" stimuli, scaled by judgments of "Complexity 2," since two unitary stimuli are involved. Corresponding Item B illustrates "composite" stimuli scaled by judgments of "Complexity 4." Item C is of "Complexity 3."

SUBJECTS: The total schedule involving the five unitary items and their ten composites in various combinations was administered to 91 psychology students.

RESULTS: Since the discriminant dispersion for a set of stimuli varies inversely as the standard deviation of the distribution of scale values for that set of stimuli, the ratios of standard deviations for the same set of stimuli scaled under two complexity conditions was determined.

For unitary stimuli scaled by judgments of Com-

plexity 2, and by judgments of Complexity 3, this ratio was found to be approximately as the square root of 3 to the square root of 2.

For composite stimuli scaled by judgments of Complexity 3, and by judgments of Complexity 4, this ratio was also found to be approximately inversely as the square roots of the complexities.

CONCLUSION: The discriminant dispersion is approximately proportional to the square root of the "complexity" where this is taken to be the number of stimuli involved in each judgment.

Slides.

1:50. Description of paired comparison preference judgments by a multidimensional vector model.
LEDYARD R TUCKER, *Educational Testing Service and Princeton University*.

The preference systems of individuals in a group are described by a multidimensional vector model. Different individual's preferences are accounted for by representing each person by a vector which may be oriented in any direction in a preference space. Objects judged are represented as points in this space. The scale of values or preferences for each individual is represented as proportional to the projections of the object points on the person's vector. Both the object points and the person vectors may be referred to a system of dimensions of preference.

In applying this model to paired comparison judgments, difference vectors are employed to represent the pairs of objects. Each pair of objects, thus, is considered as a separate variable and a table of tetrachoric intercorrelations may be obtained. There will be a row and a column of this table for each pair judged. Procedures have been developed for condensing data of this type to a description of the relations between the object points and then to coordinates of the objects on reference dimensions. An arbitrary translation of the origin is made to the centroid of the object points.

The Thurstone-type scale obtained from paired comparisons is compatible with the vector model.

A first experiment with the foregoing model involved paired comparisons for seven desserts by 73 Princeton University undergraduates. A Thurstone-type paired comparison scale was computed which yielded a good fit to the observed proportions. Application of the vector model yielded a two dimensional common preference space. One dimension yielded a contrast in preference between several berries with cream and several kinds of melon. The second common dimension has not been interpreted. The more usual type of paired comparison scale is not representable in this common preference space, but would involve, also, the unique preference dimensions.

2:10. A reduced response system in psychophysical discriminations. STANLEY DEUTSCH, *U. S. Navy Electronics Laboratory*.

Navy sonar operators are required to make auditory discriminations between the pitch of a reference tone and that of a following echo, responding according to a trichotomous system: up, no, or down doppler. It was postulated that discriminations which were near threshold were classified as "no doppler" as a matter of personal convenience for the operator. The following hypothesis was developed: a dichotomous response system (up-down) will improve accuracy of pitch discrimination.

A tape recorded doppler test, containing items from 0 to 50 cycles of pitch difference was constructed and administered to 42 airborne sonar operators who had varying amounts of experience. By administering the test twice, a counterbalanced order of presentation was employed. Group A used the trichotomous response system initially, then used the dichotomous system for the same items. This order was reversed for Group B.

All items without doppler were eliminated from the analysis. Superior performance resulted when the two-category system was employed in contrast with the three-category system; the difference was significant beyond the one per cent level of confidence. The increment in measured performance attributable to use of the dichotomous response system was nearly 50 per cent.

Although the error factor is normally less for a trichotomous response system as opposed to a dichotomy, in cases similar to that presented here, the dichotomous response system may prove to be superior.

It is concluded that response systems which force the student to make positive responses to psychophysical stimuli produce results which are more indicative of ability in the skill measured than when response systems are used which permit the student to employ a "doubtful" category.

Slides.

Division 14. Symposium: Problems and Procedures in the Applied Use of Sociometric Techniques

1:30-3:30. Franciscan Room, Sir Francis Drake

E. P. HOLLANDER, Chairman

Participants:

T. R. VALLANCE. Field utilization and related problems.

WILSE B. WEBB. The use of differing sets, self-ranks, and discrepancy scores.

ROBERT L. FRENCH. Sociometric procedures in research on bomber crews.

JOAN H. CRISWELL. Strengths and weaknesses in the current application of sociometric techniques.

Division 19. Human Engineering II

1:30-2:30. Empire Room, Sir Francis Drake.

JOHN C. FLANAGAN, Chairman

1:30. Simultaneous two-hand tracking performance using curvilinear-linear and curvilinear-curvilinear control-pointer motion relations in combination. HUGO F. SAHLEIN, *U. S. Navy Electronics Laboratory*. (Sponsor, A. C. Hall)

Simultaneous two-hand tracking performance was investigated in a continuous two-dimensional target acquisition task. Two rotary knob controls positioned the tip of a pointer at the center of a slow moving target to return it to the center of a cathode-ray tube display. Clockwise movement of the left-hand control extended the length of the pointer; clockwise movement of the right-hand control rotated the pointer clockwise. Accuracy of left-hand performance was determined for differences in the left-control and target motion relation when the right-control and target motion relation was the same. This performance was observed for two target speeds in two sectors of pointer origin: 12 and 6 o'clock. Similar consideration was given to right-hand performance.

The variables were considered in factorial combination with each of four Navy enlisted subjects performing under each combination of conditions. Subjects were required to make the necessary control adjustments during a 0.9 second period, a period characteristic of the equipment involved. Continuous error records were taken showing differences between true target position and pointer-tip position in both azimuth and length.

Left-hand performance was (a) poorest and influenced more by target speed when both control movements were in the same direction, and (b) best when the left- and right-control movements were clockwise and counterclockwise, respectively. Right-hand performance was poorest when left-hand performance was best. The results suggested bilateral interference and a confusion of the control-display relationship especially for the 6 o'clock sector.

1:45. A study of target appearance on the radar scope using various electrical parameters, filters, and sweep characteristics. SIEGFRIED J. GERA-THEWOHL, *USAF School of Aviation Medicine*.

PROBLEM: The visual task of the radar observer mainly concerns the identification of objects or targets on the ground. This ability depends on perceptual fac-

tors as well as on physical and electrical parameters which determine the appearance of the target to be detected. In order to evaluate these variables and to predict the effects of any proposed change in a given system, we need to know the laws governing the characteristics of the system and its display.

METHOD: A radar flight simulator, AN/APS-T1A was used in conjunction with an APQ-13 radar training set. The artificially introduced targets appeared on the phosphor of a 5FP7 and 5FP14 tube which are common components of airborne radar. Four standard targets were used to determine the brightness contrast at five different appearance levels: (a) target detection, (b) target recognition, (c) optimum definition, (d) maximum gain voltage, and (e) maximum gain setting. Target and background luminance were measured during (a) the brightest, and (b) the darkest phase of the excitation cycle by two highly trained observers while the set was in operation. Sweep movement, sweep brightness, and video gain were varied systematically, and various types of sweep covers were used in order to reduce eye strain. The electrical parameters were controlled by two voltmeters connected with the cathode and the grid of the CRT.

RESULTS: Brightness and contrast differences were found between the two types of sweep rotation, two degrees of basic sweep brightness, five levels of target appearance or video gain setting, and four kinds of sweep covers. Sectoring yields in general higher contrasts than continuous sweep rotation. The optimum contrasts were found at the recognition and optimum definition level; the lowest, when the video gain setting was at its maximum. Polaroid filters or sweep covers cut peak brightness, and thereby brightness contrast, during maximum excitation. The application of the findings to Air Force problems will be discussed.

Sound film and slides.

2:00. A comparison of the readability of a linear and a logarithmic scale. VIRGINIA L. SENDERS AND JEROME COHEN, *Antioch College*.

PROBLEM: To compare the readability of a linear scale with that of a logarithmic scale, using different kinds of distribution and sequence of pointer settings.

SUBJECTS: 16 undergraduate volunteers.

PROCEDURE: Pointer settings were grouped into sequences of nine settings each. The settings increased or decreased either linearly or logarithmically. Settings from linear sequences formed an approximately rectangular frequency distribution; those from logarithmic sequences formed a positively skewed distribution. The same settings were also presented in a random order. All settings, in both orders, were pre-

sented on both scales. Thus eight experimental conditions resulted from the combinations of linear and logarithmic scales, skewed and rectangular setting distributions, and random and regular progressions. Stimuli were presented tachistoscopically for exposures of .8 second. Each subject was tested under every condition.

RESULTS: When error is expressed in scale units the linear scale is superior to the logarithmic, the skewed distribution to the rectangular, and the regular order to the random. The use of a regular order improves performance more on the logarithmic scale than on the linear. In terms of angular deviation of response from setting, the logarithmic scale is superior to the linear, and the regular order to the random; for the linear scale the skewed distribution was superior, but for the logarithmic scale there was no difference between distributions.

For the logarithmic scale, log median error in scale units was directly proportional to the logarithm of the numerical value of the pointer setting.

CONCLUSIONS: The use of a logarithmic scale is to be recommended (a) where tolerance is a constant percentage of the indication, and (b) where many pointer settings occur in the low end of the scale range, and it is desired to minimize average error in scale units. Implications of the findings for research methodology are discussed.

Slides.

2:15. The visual reinforcement of auditory cues.

JOHN H. STROESSLER AND FRED T. GRIMM, *U. S. Navy Electronics Laboratory*. (Sponsor, W. K. Orr)

In order to determine the effectiveness of visual reinforcement to the learning of pitch discrimination, an electronic visual aid (EVA) was devised and used during the training of a class of 38 Navy sonar students. On the basis of a pretest, consisting of 60 reference tones at 800 cps and corresponding cue items of 0 to 30 cps above or below the reference tone, the class was divided into two equivalent groups. Both groups (A and B) received four hours of identical training with the exception that the experimental group (B) received reinforcement of their auditory cues by a specially devised electronic visual aid (EVA). Groups A and B were posttested on an equivalent form of the pretest.

EVA consisted of a Bearing Deviation Indicator which had been modified to accept a signal through two germanium diodes applied to their upper or lower vertical deflection plates or equally to both. This permitted presentation of a horizontal sweep on the scope when keyed by the recorded 75-cycle pulse.

Each echo was shown as being deflected up, down, or neither by presetting a toggle switch on the device.

A comparison of the pretest and posttest scores revealed that group A made 14.9 per cent improvement in doppler discrimination ability during the training period, and that group B made 16.9 per cent. Therefore, the use of EVA resulted in an ability increase of 2 per cent which the *t* test revealed to be due to chance.

The use of a visual training aid such as EVA for showing the direction of doppler does not appear to be warranted in a classroom situation.

Slides.

Division 3. Sensation

2:40-3:40. Room 2127, Sheraton Palace

HOWARD D. BAKER, Chairman

2:40. The oculomotoric pattern of circular eye movements during increasing speed of rotation. HUBERTUS STRUGHOLD AND WILLIAM F. TAYLOR, *USAF School of Aviation Medicine*. (Sponsor, Siegfried J. Gerathewohl)

PROBLEM: The purpose of this study was to record and analyze the basic pattern of guided circular eye movements with regard to form and speed. This investigation will be useful for the evaluation of oculomotoric time-space patterns, and for the design of equipment which makes circular eye movements mandatory.

PROCEDURE: A Master Ophthalmograph (American Optical Company) was remodeled for the purpose of photographing the saccadic eye movements of 10 male test subjects when following the movement of a fixation mark on a black disk. The disk was rotated at speeds ranging from 15 to 85 r.p.m. Time was recorded by a motor-driven propeller which interrupted the light beam reflected from the cornea of the subject at 0.5 second intervals.

Three experiments were made with (a) eye movements at a constant rotational speed of 15 r.p.m. over a period of 30 seconds; and during gradually increasing speeds from (b) 20 to 45 r.p.m., and (c) 40 to 85 r.p.m. All experiments included clockwise and counterclockwise rotations. The records were then quantitatively analyzed according to a standardized procedure.

RESULTS AND CONCLUSIONS: The photographic records were analyzed with regard to (a) number and (b) extent of the eye movements per cycle, per second, and per movement, respectively.

The results suggest that the changes in speed of rotation are associated with changes in the frequency of saccadic eye movements. Increasing speed results in fewer movements per revolution of the target

image, and in more movements per second of time. Furthermore, a higher number of eye movements occurred during counterclockwise rotation than during clockwise pursuit. The interaction between speed and direction of rotation for the number of movements was analyzed statistically.

An analysis of variance was also made for the measurements of the extent of saccadic movements. An increment of magnitude was found as the speed of rotation increased. By combining the findings on number and extent of movements, one can conclude that as the rotational speed increases the movements of the eyes become more frequent and more extensive. Lantern slides.

2:55. Comparison of the differential sensitivity of the ear and the eye to intermittence. G. HAMILTON MOWBRAY AND J. W. GEBHARD, *Johns Hopkins University*.

Difference limens for flutter (intermittent white noise) have been measured at 16 frequencies in the range of 1 to 45 cps to compare with analogous data previously obtained on the differential sensitivity of the eye for flicker (intermittent white light). The standard and comparison flutter frequencies were heard binaurally through headphones at a sensation level of 50 db. The output of the same random noise generator was interrupted by an electronic switch at rates controlled with a standard and a comparison rectangular pulse generator. At all frequencies the noise-time fraction was 0.5. The subject controlled a switch by which he listened to the standard and comparison flutter frequencies successively while obtaining ascending and descending matches by the method of adjustment. The discrepancy in the match was measured with an electronic interval timer. Flutter data from two practiced subjects show that the average deviations from the standard are linearly related to frequency. Δf increases from 0.015 to 0.37 between 1 and 45 cps. The relative difference limen, $\Delta f/f$, is in the range 0.015 to 0.005 and is nearly constant through most of the range. These DLs for flutter are lower, by more than one log unit, than those that have been reported previously. The psychophysical functions of the eye and ear differ in that Δf for flutter is proportional to frequency, whereas, Δf for flicker is a complex function of frequency. Measurements at a sensation level of 50 db show the ear is more sensitive than the eye from 1 to 25 cps, and less sensitive from 25 to 45 cps. For the range studied, graphic integration of $1/\Delta f$ with respect to f gives 450 just noticeable differences for flutter and 280 for flicker.

Slides.

3:10. The influence of training with relevant and irrelevant dimensions on pitch discrimination.

DONALD A. RILEY AND LEWIS F. PETRINOVICH,
University of California.

PROBLEM: (a) What does the subject learn about the stimulus when he improves in his judgment of pitch? (b) Can interference effects similar to those found in verbal learning be demonstrated in judgment of pitch?

SUBJECTS: 225 college students.

PROCEDURE: All subjects were given an initial series of 70 paired tones. These consisted of a standard (1,000 ~, 40 db) followed by a variable assigned any of seven frequencies between 997 and 1,003 ~ and any of seven amplitudes between 39 db and 41 db. Every frequency appeared with every amplitude at least once. A random order with certain restrictions was used. Subjects judged the second tone higher or lower in pitch than the first.

Several experimental conditions were run. In most conditions, the identical 70 pair series referred to above was presented three more times with experimental manipulations in the middle two series. Experimental variations included: No information on correctness of judgments; information after each judgment; information vs. no information on tones 100 ~ higher than test series; information vs. no information on judgments of loudness; repeats of basic conditions with last series resampled; repeats of basic conditions with amplitude variations omitted.

RESULTS: (a) Judgment in pitch without information yields improvement in performance ($p < .01$); information produces more improvement ($p < .01$). (b) When training stimuli are higher than test stimuli information produces improvement intermediate between information and no information. (c) Information on loudness produces improvement in judgment of pitch about equal to no information, and may cause interference when it follows pitch training. (d) Omission of amplitude variations in the test series eliminates the effectiveness of information training.

CONCLUSIONS: Improvement without information cannot be explained by the present data, but some possibilities can be discarded. Improvement related to information is apparently dependent on variations in both amplitude and frequency.

Slides.

3:25. Differential sensitivity in gustation. HOWARD G. SCHUTZ AND FRANCIS J. PILGRIM, *Quartermaster Food and Container Institute, Chicago*.

PROBLEM: To determine differential sensitivity ($\Delta I/I$) for the four primary taste qualities over a wide range of concentrations; to explore individual differences with regard to qualities.

PROCEDURE: The method of single stimuli with four judgment points was used for the four qualities each at five levels spaced logarithmically from near absolute threshold to extremely strong. For these 20 values ten subjects (five male and five female) each made eight judgments at each of the four points. Least squares straight lines were fitted to the transformed proportions judged stronger, and the slopes of the lines were then subjected to analysis of variance.

RESULTS: Sensitivity to the form qualities differs significantly, with the $\Delta I/I$ ranging from 0.15 for salt to 0.30 for bitter. The $\Delta I/I$'s for each quality do not differ over level except at the extremes for two qualities. Individuals differ widely in sensitivity within a quality and in the order of sensitivity to the different qualities. The constant error was essentially nonexistent and the variabilities of the PSE and that of the points about the least squares line were small. Sensitivity was not related to subjective intensity or to the preference.

Slides.

Division 5. Prediction Studies

2:40-3:40. California Room, Sheraton Palace

PHILLIP J. RULON, Chairman

2:40. Applying multiple-stage criteria in predicting the development of managerial personnel. HOWARD G. MILLER AND E. P. HOLLANDER, *Carnegie Institute of Technology*.

PROBLEM: This paper deals with an ongoing study aimed at the selection and development of managerial personnel. In contrast to more traditional approaches, the current study stresses prediction of more ultimate criteria derived from pooled group ratings, among other measures.

SUBJECTS AND SETTING: The total population of 80 graduate students entering the two-year M.S. program of the Graduate School of Industrial Administration, Carnegie Institute of Technology, from 1951 through 1954 was studied. The students' mean age at entry was 24 and all had had an undergraduate major in science or engineering.

METHOD: Predictors were selected covering the basic variables hypothesized to be related to academic performance and to ultimate performance in a managerial career. A wide variety of instruments was used including measures of ability, vocational interest, personality, and attitudes, in addition to indices of previous performance. The criteria employed were designated multiple-stage since performance was measured directly, or by extrapolation, at more than one stage of development. Thus far two such stages have been employed: the graduate training level and

the professional performance level. Stage one has been subdivided into academic evaluations and more global evaluations of personal characteristics by faculty and fellow students. Stage two has been based upon predictions of managerial performance obtained through rating techniques from these same groups.

RESULTS: *In general terms, significant relationships* were discerned between both ability measures and indices of past performance taken against graduate grades, as a stage on criterion. Measures of ability had a low relationship with later stage criteria, however, while certain measures of interest and personality tended to be significantly related to these criteria.

CONCLUSIONS: The results are discussed in connection with the utility of such a longitudinal approach in the prediction of managerial performance.

2:55. Prediction of success in a work-sample course in Mandarin Chinese. JOHN B. CARROLL AND STANLEY M. SAPON, *Harvard University*.

PROBLEM: This is one of a series of studies whose objectives is the development of foreign language prognosis tests for various age levels. In these studies, battery validity has varied widely, apparently depending upon the nature of the group tested and the type of instruction. This paper reports a case where extremely high validity has been obtained in two independent samples.

SUBJECTS: Airmen who volunteered for a five-day intensive "trial course" in spoken Mandarin, successful passing of which would allow them to attend a full course in Chinese at a civilian university. There were two samples, 80 tested February '54 and 88 tested June '54 (exclusive of a small number of voluntary withdrawals).

PROCEDURE: Four-hour batteries, consisting mainly of new experimental tests, were administered at the outset of the trial course. The criterion variable was the academic grade assigned by the course instructors at the end of the course or upon the elimination of the student.

RESULTS: In the February sample, four tests selected by the Wherry-Doolittle procedure yielded a multiple R of .75. Cross validation of this regression equation on the June sample yielded $r = .77$, but an improved group of four tests yielded $R = .84$.

CONCLUSIONS: Success in a trial language course is highly predictable from a one-hour battery of tests. The high validity may have been achieved because the students were highly motivated and because the instructors taught strictly and made no attempt to salvage poor students. The most useful tests were those measuring verbal knowledge, sound-symbol association ability, immediate rote memory for foreign lan-

guage vocabulary, grammatical sensitivity, and inductive learning of artificial language structure.

These studies are supported by a grant from the Carnegie Corporation of New York.

3:10. Decision-making under uncertainty. WILLIAM

H. McGLOTHLIN, *The RAND Corporation.*

PROBLEM: There is an increasing interest in strategies and models for predicting decisions among uncertain alternatives. Problems in this area include: stability of decision-making over a series of risk-taking events, the role of variance preference in decision-making, effect of reinforcement on succeeding choices. This study uses horse-race betting statistics to provide partial answers to these problems.

DATA: Parimutuel statistics from 9,605 thoroughbred horse races from 1947-1953.

PROCEDURE: Mathematical expectations for parimutuel odds of 1-1 to 26-1 were calculated for each of the eight races in the daily racing program. Expectations were also calculated from parimutuel odds corrected for track deductions. Preferences for variances were found by examining the proportions of the total mutuel handle wagered in win, place, and show pools for each of the eight races.

RESULTS: Except for eighth races, all expectations calculated from track odds were negative. When corrected for track take, all eight groups of races yielded positive expectations for low-odds horses (high probability of success), and negative expectations for high-odds horses (low probability of success). In general, plots of expectations as functions of odds yielded a relatively stable pattern over the eight groups of races. Bettors tended to increase the variance of their wagers as the racing day proceeded by increasing the size of bets, and by wagering larger proportions in the relatively high-odds win pool in preference to place and show bets. As a group, losing bettors wagered larger amounts on succeeding races than did winning bettors.

CONCLUSIONS: The relatively stable expectation-odds pattern over a series of risk-taking events where variance preferences show large, regular increases cannot reasonably be accounted for by a decision-making model based solely upon unchanging subjective probabilities and utility functions. Variance preferences apparently play an important role in this type of decision.

3:25. Finding scientific talent. JOHN R. HILLS,

Educational Testing Service.

PROBLEM: What psychological factors are related to success in mathematics? What implications have such relationships for the guidance of potential scientists?

SUBJECTS: 148 physics, mathematics, and engineering

students from three college-level institutions.

PROCEDURE: Scores on measures of the factors of eduction of conceptual patterns, originality, numerical facility, verbal comprehension, adaptive flexibility, general reasoning, logical reasoning, spatial orientation, and spatial visualization were correlated with three criteria: (a) grades in college mathematics courses, (b) ratings of mathematical proficiency or promise, and (c) scores on a test of mathematical proficiency.

RESULTS: Correlations were examined separately within the various curriculums, and institutions, and for the three criteria. They ranged from - .44 to + .72 for the individual measures. In general, the measures of general reasoning, verbal comprehension, eduction of conceptual patterns, and originality were found to be unrelated to these criteria. A number of the correlations involving the measures of the other factors were positive and significant. The measures of logical reasoning, spatial orientation, and adaptive flexibility appeared to be related to success in mathematics in certain criterion-curriculum-institution contexts but not in others, the differences in magnitude of correlation being statistically significant.

CONCLUSIONS: There may be no trait or set of traits which accounts for mathematical aptitude in general. Instead, the set of traits related to success in mathematics may depend on the specific criterion-curriculum-institution context. If this is the case, there may be many more potential scientists and technicians available than would be the case if there were only one aptitude or set of aptitudes permitting success in this field. To take advantage of this, local normative data on the useful traits in local situations would have to be gathered and published for wide use by counselors.

Division 19. Military Training Research. I

2:40-3:40. Empire Room, Sir Francis Drake

RICHARD H. HENNEMAN, Chairman

2:40. Early learning in radar scope interpretation.

WILLIAM A. McCLELLAND, *Aircraft Observer Research Laboratory, AFPTRC, Mather Field.*

PROBLEM: 1. To determine if radar scope interpretation (RSI) skill is improved by training with scope motion pictures.

2. To explore the utility of radar scope motion pictures in teaching RSI to Air Force personnel.

SUBJECTS: 1. Twenty-three college students possessing no previous experience in RSI.

2. 135 Air Force officers and aviation cadets enrolled in elementary and advanced radar courses.

PROCEDURE:

(College Student Study)

1. Prepare experimental materials (approximately 18 hours of RSI motion pictures) to be projected on individual trainers. (The task required correlating about 300 selected radar returns from the motion pictures with charted natural and cultural features contained on a map of the area.)

2. Obtain a pretraining estimate of RSI proficiency.

3. Conduct experimental training for eleven experimental subjects, obtaining accuracy and time scores for each response.

4. Readminister the RSI proficiency test to all subjects. Examine these and the time and accuracy scores for evidence of learning.

(Air Force Study)

5. Examine the operational utility of the technique in two Air Force radar courses.

RESULTS: 1. College students with no previous radar experience made significant gains on the RSI proficiency test as a result of the motion picture training. While accuracy scores obtained by the experimental subjects during training showed little change, time scores decreased significantly.

2. The operational test of the motion picture technique showed it to be of value in elementary RSI training. Largely negative results were found when it was included in an advanced course.

CONCLUSIONS: 1. Early learning in RSI was demonstrated. RSI skill improves with training by means of radar scope motion pictures when radar-naive students serve as subjects.

2. Radar scope motion pictures were of value as an Air Force ground training technique in elementary radar training.

Slides.

2:55. Training leaders with sound films and discussion group techniques. CARL J. LANGE AND CARL H. RITTENHOUSE, *Human Research Unit No. 2, Continental Army Command, Fort Ord.*

A leadership course for training junior Army officers was developed, utilizing sound films for portraying leadership problems. The primary object of the course was to provide student officers with an opportunity to practice solving leadership problems typical of those which the officers would meet early in their careers. The training emphasized problems in interpersonal relations between the officer and his superiors, subordinates, and peers.

The course included:

1. Presentation of leadership problems with sound films.
2. Acting out solutions to problems presented with the films.
3. Small group discussion of the problems and their solutions.
4. Panel discussion of various solutions.

The sound films, lasting from five to ten minutes each, developed the problems to the point where the leader is faced with making a decision and taking action to solve the problem.

The small group and panel discussions were used in conjunction with role playing to maximize the participation of each student.

An experimental study of the training course was conducted at the Officers Candidate School at Fort Sill, Oklahoma. The experimental training course was administered to two OCS classes in place of the usual leadership training course. Two OCS classes receiving the usual training served as control groups. Results of the study demonstrated that the students' ability to formulate solutions to leadership problems was improved and that students' ability to judge leadership ability among their peers was improved. Changes were statistically significant at the .01 level.

3:10. Improvement in the tactal discrimination of knob shapes with training and practice. GORDON A. ECKSTRAND AND ROSS L. MORGAN, *Aero Medical Laboratory, Wright Air Development Center, Wright-Patterson Air Force Base.*

The purpose of this study was to investigate the effects of training and practice upon the ability to discriminate among similar knob shapes.

After differing kinds of prior experience, three groups of 20 subjects each were tested on a task which required tactal discrimination among four similar knob shapes. During this test a knob was presented visually for about two seconds. Immediately thereafter, the subject grasped an unseen knob mounted on a lever. The subject operated the lever if he believed the knob sampled tactually was the same as the one viewed, but removed his hand if he believed it to be different. For half of the trials the two knobs were the same, and for half they were different. Each subject made two identical series of 24 such discriminations. Errors and discrimination time were recorded. Prior to performing this task a Control Group was given no training, a Tactual-Name Group learned to associate "names" with the feel of the knobs, and a Tactual Group was given experience only at feeling the knobs.

The Tactual-Name was significantly superior to the Control Group by both the time and errors criteria. The Tactual Group was superior to the Control Group in terms of the errors criterion only. All groups improved their performance significantly from the first half to the second half of the test trials and "same" discriminations were made significantly faster and with fewer errors than "different" discriminations.

The implications of these results for equipment design will be discussed.

Slides.

3:25. An experimental comparison of "live" and filmed lectures employing mobile training devices. HARRIS H. SHETTEL, JR., EDMUND J. FAISON, AND SOL M. ROSHAL, *Air Force Personnel and Training Research Center, Chanute Air Force Base.*

PROBLEM: To compare the relative effectiveness of several types of mobile training devices when used in "live" lecture situations vs. filmed lecture situations in the transitional training of skilled mechanics. **SUBJECTS:** 165 experienced Air Force aircraft maintenance technicians.

PROCEDURE: Instruction was given on either the fuel or rudder control systems of the B-47. Half of the men assigned to the fuel system were trained with a "live" lecture in conjunction with an operating mock-up trainer; the other half by means of a motion picture of this same presentation. Half of the latter group was given a second showing of the film immediately before taking a delayed test. For the rudder control system two different types of mock-up trainers were used in both "live" presentations and filmed presentations. Pretests on the fuel and rudder systems, posttests and delayed tests (given six to eight weeks after posttest) were administered.

RESULTS AND CONCLUSIONS: Scores on the pretest were at chance level. Posttest results revealed that the "live" lectures produced slightly but reliably higher scores than the filmed lectures for two of the three devices used. Results for the delayed test showed that for those men not receiving a second viewing of the film, no reliable differences remained between those originally exposed to the "live" lectures and those originally exposed to the filmed lectures. However, those men who saw the film again just prior to taking the delayed test did as well on the delayed test as they had on the posttest, and did reliably better on the delayed test than did those men who did not see the film again.

These results lend support to the feasibility of using films to supplement or replace the more expensive and cumbersome mobile training devices presently used in transitional training programs.

Slides.

Division 1. Symposium: Learning and Performance Without Awareness

3:50-5:50. Italian Room, St. Francis

CHARLES W. ERIKSEN, Chairman

Participants: JOHN I. LACEY, LEO POSTMAN, AND WILLIAM S. VERPLANCK.

Division 3. Vision III

3:50-4:50. Room 2127, Sheraton Palace

JOHN L. BROWN, Chairman

3:50. The effects of lateral target separation and of distance on binocular depth discrimination. WARREN H. TEICHNER, JOHN L. KOBICK, AND E. RALPH DUSEK, *Quartermaster Research and Development Center.*

Studies of the effects of viewing distance on commonplace depth discrimination have yielded very similar results even though in some studies the visual angle of the lateral target separation was held constant at different distances and in others it varied with distance. This suggests that the separation angle may not be an important variable in commonplace depth discrimination as it is known to be in stereoscopic and vernier acuity. One purpose of this study was to test this hypothesis. Another purpose was to extend previous studies of the distance parameter which have covered a range from 100 to 3,000 ft. to ten to 100 ft.

Two experiments were performed. In one, two of the authors serving as subjects made 12 settings at each of seven linear target separations at ten viewing distances from 10 to 100 ft. In the second experiment each of three soldiers made 24 settings with six separations at the ten distances. Two white 3-in. squares which rode on a hidden track in a long black table provided the standard and comparison targets. Movement of the comparison target was controlled by the experimenter. The subject was not allowed to correct his first judgment.

The trends of the two experiments were very similar. Target separation had a significant effect, but only at the extreme distances and there not consistently or systematically. This suggests that the separations might have affected visual acuity, and thereby only indirectly affected depth discrimination. The effects of distance were the same as in studies using longer ranges, i.e., both the precision of the settings and the associated binocular image disparity varied parabolically with distance. Curves fitted to the soldier-subject trends yielded parameters numerically close to those obtained in previous studies; curves based on author-subject data were similar in form but different in rate, i.e., precision decreased less rapidly with distance; image disparity decreased more rapidly.

Slides.

4:05. The effect of distribution of practice on learning to track with the eye. J. H. DE RIVERA AND WILSE B. WEBB, *U. S. Naval School of Aviation Medicine.* (Sponsor, Wilse B. Webb)

A method of testing visual acuity for a moving object has been developed by Elek Ludvigh. The subject is seated in front of a revolving mirror and views monocularly the image of a Landolt ring as it moves

by on the mirror. He then indicates the direction of the ring's opening. The image is exposed for .4 seconds. When the mirror revolves at a fast speed, subjects with the same static acuity show wide individual differences in "dynamic" acuity. With increased practice, subjects generally judge more images correctly and a typical learning curve evolves. Since the image is only resolved when it has been tracked correctly we have here a technique, unencumbered by any additional motor responses, for investigating the tracking response of the eye. Two things are important to note about this particular response. First, the muscles involved are overpowered and cannot possibly become fatigued. Second, the time interval involved is so short that direct feedback is not important in adjusting the response.

A sample of 102 subjects were divided into 3 equal groups. Group A saw an image every 14 seconds, Group B every 7 seconds, Group C every 3.5 seconds. The same size ring was used for all subjects over 50 successive trials. Approximately the same number of people in each group reached a criterion of 6 out of 10 correct. However, the more massed the practice the fewer number of trials were required to reach the criterion. A three-way analysis of variance between massing conditions, individuals, and trials showed significant differences at the .001 level in favor of massed practice. The above data are discussed with regard to current interpretations of the effects of distributed practice.

Slides.

4:20. Some direct measures of stray light in exised eyes. D. W. DEMOTT AND R. M. BOYNTON, *University of Rochester*. (Sponsor, R. M. Boynton)

PURPOSE: Previous studies by Boynton, Enoch, and Bush used a direct method to measure the stray light in an exised eye at varying glare angles. The present paper presents an extension of this work, together with a photographic technique which yields more analytic data on the proportional contribution of scatter from specific points in the media.

SUBJECTS: Exised eyes from steer, sheep, and hog.

PROCEDURE: A focused beam of light was introduced through the pupil, at a variable angle. Photometric and photographic records were made of the stray light passing through an aperture in the sclera.

RESULTS: The intensity of stray light at the fovea for angles of incidence from 0° to 60° will be presented. The proportional contributions of the different media, and of loci within the lens will be presented quantitatively and by means of photographs. Color slides will be shown to demonstrate the chromatic scatter in the lens substance. The course of post-mortem changes in stray light distribution will be

shown, with a tentative extrapolation to the *in vivo* condition.

Slides.

4:35. Sensitivity to different frequencies of electrical stimulation during dark adaptation. RUSSELL L. DE VALOIS AND O. THOMAS LAW, *University of Michigan*.

METHOD. Flickering phosphenes resulting from periodic electrical stimulation of the eye were observed during dark adaptation. Each of the three subjects light adapted to 500 ft. lamberts for three minutes, then sat in the dark, fixating the center of an array of four faint fixation lights while phosphene thresholds were determined. Current values for central and peripheral phosphene thresholds were determined by a modified method of limits every minute for 12 minutes, and at longer intervals thereafter. The electrical stimulus consisted of square waves of reversible polarity with an on-off ratio of .60, produced by a constant-current stimulator fed through a mechanical commutator. Seven frequencies of stimulation were studied: 5, 8, 10, 15, 20, 30, and 50 cps.

RESULTS: 1. Central and peripheral phosphenes appear phenomenally to be quite distinct entities. The central ones appear at threshold in an area of roughly 5° diameter in the center of the visual field; the peripheral ones appear around the outside of the field, with a large space separating the two flickering areas.

2. The relation found in the light-adapted state between central and peripheral thresholds is inverted during dark adaptation, the time of the inversion depending on the frequency of the stimulation.

3. The slope as well as the absolute level of the phosphene dark-adaptation curves is a function of frequency.

4. Schwarz, Gebhard, and others found the lowest threshold at 20 cps in the light-adapted state. During dark adaptation the frequency at which the lowest threshold occurs is dependent on (a) length of time in the dark, and (b) whether central or peripheral phosphenes are considered. In general, the minimum threshold shifts to the lower frequencies during dark adaptation.

Slides.

Division 5. Performance Evaluation

3:50-4:50. California Room, Sheraton Palace

ABRAHAM CARP, Chairman

3:50. Performances of male and female recruits in mechanical-motor learning. ROGER B. ALLISON, JR., *Educational Testing Service*.

PROBLEM: To study the performances of male and fe-

male Navy recruits in learning a mechanical-motor skill.

SUBJECTS: Four groups (N 's > 100) of Navy recruits at a Recruit Training Center.

PROCEDURES: A miniature training situation was used in which learning the assembly of the breech block of a 40 mm. antiaircraft gun could be investigated. Instruction was presented by sound film. For two groups, one male and one female, mechanical-motor learning was assessed by means of the Breech Block Performance Test. For another pair of groups, learning the same task was assessed with the Pictorial Assembly Test, a paper-pencil test. Scores from the Navy Basic Test Battery, a mechanical comprehension test, and a mechanical experience check list were also obtained.

RESULTS: With respect to the average rate-of-work score derived from several trials of the Breech Block Performance Test, and scores for two trials of the Pictorial Assembly Test, the performances of male and female recruits were the same. With respect to the percentage of subjects completing the assembly of the breech block, female recruits appeared to lag one trial behind the male recruits. Conventional sex differences appeared in test scores on mechanical knowledge and experience; females scored higher than males on the Clerical Aptitude Test. Scores on other tests were essentially the same for the two sexes.

CONCLUSIONS: Under controlled learning conditions, female recruits were able to learn a mechanical-motor skill and earned performance scores comparable to male recruits, despite obvious background differences. Implications for the training and selection of personnel will be discussed.

Under joint sponsorship of the Bureau of Naval Personnel and Office of Naval Research.

4:05. A comparative study of aptitude patterns in unskilled and skilled psychomotor performances.

EDWIN A. FLEISHMAN, *Air Force Personnel and Training Research Center, Lackland Air Force Base.*

PROBLEM: The study was designed to (a) compare factors found at advanced levels of proficiency with those found at early levels on the same tasks, (b) confirm factors found in previous analyses of extended practice by a different method of analysis, (c) explore the possibility that certain kinds of factors are common only to advanced levels of proficiency, and (d) establish if the specific variance found to increase late in practice can be defined when advanced proficiency measures from other tasks are included in the analysis.

SUBJECTS: 200 basic airmen.

PROCEDURE: Subjects received extended practice on seven experimental psychomotor tests and in addition received a battery of printed and apparatus reference tests. Two comparison factor analyses were carried out on the intercorrelations among four stages of practice on one of the psychomotor tasks, the Complex Coordination test, and fourteen other psychomotor and printed tests. The analyses were identical except for the scores included for six of the experimental psychomotor tests. In one analysis only scores obtained on these tests at late stages of proficiency were used, and in the other analysis only early stage scores were used.

RESULTS: The same eight factors were identified by the reference tests in each analysis as: Visualization, Rate of Arm Movement, Perceptual Speed, Mechanical Experience, Spatial Relations, Psychomotor Coordination, Response Orientation, and a Complex Coordination Test specific. However, the factor patterns for the six psychomotor tests were quite different when the late stage scores were substituted for the early stage scores.

CONCLUSIONS: Aptitude patterns contributing variance in skilled performances are different from those contributing at earlier proficiency levels. No new factors were found confined only to advanced proficiency measures. The question was one of degree of involvement of particular factors already identified.

Implications for predicting more advanced levels are discussed in terms of aptitude and learning theory.

4:20. Effect of a refreshment pause on the learning curves of certain complex performance tasks.

VIRTUS W. SUHR AND A. R. LAUER, *Iowa State College of Agriculture and Mechanic Arts.*

The hypothesis to be tested is that refreshment pauses will increase driving efficiency of simulated nature.

The study to be reported is that of the effects of three hours continuous performance of a type of simulating driving performance under controlled conditions to two groups of subjects of 28 and 25, respectively. Each group was subjected to a three-hour period of "nondriving" tests. One group, designated as a control group, consisted of 19 men and nine women, selected on the basis of driving population ratio and a second experimental group of 16 men and nine women of similar characteristics with the respect to driving experience and age. Thus each group was subjected to a total of approximately six hours experimentation and were paid subjects.

Both groups were given before-and-after tests. After the "before" "nondriving" tests, the control group was given three hours of continuous driving. Recordings were made of instruments measuring

steering efficiency, reaction time, stop-light response time, and other subscores every half hour. At the end of the driving period the "nondriving" "after" tests were administered.

The subjects of the experimental group were given a similar number of hours tests and practice but were given fifteen-minute rest periods every hour and a half at which time refreshments were served. Otherwise the two groups were subjected to the same treatment and the procedure was designed to avoid systematic errors.

RESULTS: Results will be presented in graphical form showing the trends of learning, the differences between groups, and the possible effects of the pauses. Appropriate statistical evaluations are given.

CONCLUSIONS: It may be concluded that efficiency is extended considerably by means of rest pauses and that the subjects are kept more alert by virtue of the interpolation of refreshment pauses. The before-and-after tests are not conclusive for the three-hour practice run herein reported which is part of a nine-hour run for subjects used in the main set of experiments lasting in all 15 hours for each subject.

Slides.

4:35. Investigation of certain assumptions underlying the forced-choice method. JAMES R. BERKSHIRE, *Air Force Personnel and Training Research Center*.

PROBLEM: The procedure normally used in constructing forced-choice rating scales assumes: (a) that forced-choice statements have a characteristic of attractiveness that is relatively independent of their discriminative power, and (b) that, in the construction of any particular form, the attractiveness index used has a substantial correlation with this characteristic. This study tests the validity of assumption (a), and investigates the degree to which five different attractiveness indices fulfill assumption (b).

EXPERIMENTAL MATERIALS: 300 statements previously used in developing forced-choice forms for rating Air Force instructors. A discrimination index and five indices of attractiveness (Preference, Favorableness, Upper Group Mean, Face Validity, Job Importance) were available on each statement.

PROCEDURE: An experimental form containing forty 4-choice blocks was made up. All statements in each block had the same discrimination index, but had differing attractiveness indices. The form was submitted to 58 instructor-supervisors who were asked to choose from each block the two statements that they thought would contribute positively to the total score. With discrimination index held constant within blocks, any independent characteristic of statement attractiveness should thus be reflected by nonrandom

frequencies of choice. The frequencies of choice were computed and chi square used as a test of assumption (a). Correlation coefficients were computed between the frequencies of choice and each of the five attractiveness indices as a test of assumption (b).

RESULTS: 33 of the 40 blocks yielded chi squares significant at the 5 per cent level or better. The correlation coefficients between frequency of choice and the attractiveness indices were: Job Importance .62, Favorableness .19, Face Validity .14, Preference .07, Upper Group Mean .00.

CONCLUSIONS: 1. Forced choice statements do have a characteristic of attractiveness that is at least partially independent of their power to discriminate.

2. Of the five attractiveness indices studied, only the Job Importance index was an adequate measure of this characteristic.

Slides.

Division 5 and Psychometric Society. Symposium: The Behavioral Scaling of Psychological and Educational Tests

3:50-5:50. Comstock Room, Sheraton Palace

JOHN B. CARROLL, Chairman

Participants:

FRANK M. DUMAS. The behavioral scaling of personality tests.

JANE LOEVINGER. A multiple isomorphic model for the relation of behavior to test.

LEDYARD R. TUCKER. Some experiments in developing a behaviorally determined scale of vocabulary.

Division 19. Military Training Research II

3:50-4:50. Empire Room, Sir Francis Drake

WILLIAM W. GRINGS, Chairman

3:50. Experiments in Army rifle marksmanship training. RICHARD S. HIRSCH, *Tufts College*.

Seven major experiments were conducted in rifle marksmanship involving the following variables:

1. Reduction in time spent in PRI (preliminary rifle instruction);

2. Firing practice interspersed within PRI;

3. Firing of .22 caliber as a substitute for some .30 caliber practice;

4. Specially designed training films substituted for most lectures-and-demonstrations;

5. Use of dummy ammunition during practice firing; and

6. Extension of training time and increase in ammunition expenditure.

In addition to those listed above, three minor studies were undertaken on related variables.

The results of the entire series of experiments indicate that the present standard training program does not appear to raise the level of proficiency much above that which obtains in advance of training. Given the controlled type of firing tests used in these studies, a group of trainees in advance of training may be expected to fire a mean score equal to approximately 40 to 45 per cent of the total score possible. Training raised the scores from 15 to 20 per cent, and training extended beyond the normal time yielded still further gains.

An outstanding finding of the experiments (as well as the scoring of nonexperimental groups) is that the scores set by official doctrine for qualification (marksman, sharpshooter, and expert)—when tested under controlled conditions—are achieved by only 50 per cent of the trainees. The low level of improvement found may account for the lack of significant difference attributable to the experimental variables.

The major conclusions drawn from the experiments include the following:

1. Should it be that the present level of proficiency achieved is sufficient, then it may be said that it can be obtained with less PRI, with some savings in cost by the use of the .22 caliber rifle, and with fewer well-qualified instructors by the use of well-designed training films.

2. On the other hand, if it should be desired to improve the proficiency, a somewhat extended period of training along with the expenditure of additional ammunition seems to be indicated.

3. Finally, a method is needed to score the record-firing automatically and accurately. These experiments employed a method of controlled scoring; however, the standard scoring procedure presently used by the Army fails to yield results of sufficient accuracy and reliability to provide a basis to evaluate either the training or research variables.

Slides.

4:05. Nighttime coordination of rifle fire by systematic rules rather than by control of a leader.

EDGAR L. SHRIVER, JOHN SIVY, AND HENRY ROSENQUIST.

PROBLEM: Under conditions of low illumination, no single person (including the squad leader) can see enough of either the friendly or enemy situation to adequately control the fire of a normally deployed squad.

PURPOSE: To develop a set of rules which would effectively govern the action of each friendly squad member in response to the various actions an enemy could take.

SUBJECTS: The subjects for this study were members of the Combat Training Command, Fort Benning,

Georgia. They varied in their Army experience but all had received training in the techniques of rifle fire control. This training was the standard daytime Army training which utilized instructions from a squad leader to control the fire of the squad in response to various enemy actions.

PROCEDURE: The possible actions that an enemy force might make were analyzed in terms of what they would look like to members of a friendly defending squad. These actions were then fitted into a series of dichotomies. Certain enemy actions were not inherently dichotomous but a structure was then imposed on the situation which transformed the continuous phenomenon into a dichotomous one.

A set of rules was formulated which prescribed the most effective counteraction for each enemy action. The dichotomous enemy actions, rules, and counteractions were taught to 12 squads of men. These squads and 12 matched squads, without the experimental training, were tested on a criterion range which neither group had previously seen. On the criterion range enemy actions were simulated and the reactions of the various squads measured.

RESULTS: The number of hits obtained by the experimental squads was markedly (and significantly) greater than the number obtained by the control squads.

4:20. A pilot study of the retention of basic military subject matter after separation from the service.

HARRY W. BRAUN, *University of Pittsburgh*.

PROBLEM: The purpose of this study was to determine the level of retention of basic military skills and information among ex-servicemen as a function of time since separation from extended active duty in the Army.

SUBJECTS: The subjects were 4,551 enlisted Army reserve personnel; 4,234 of these men were active participants in the Army Reserve Program, while 317 men were inactive in this program. Subjects were residents of geographically separate parts of the United States.

PROCEDURE: Retention was measured by the Basic Military Proficiency Test (BMPT) which was developed by the Personnel Research Branch, The Adjutant General's Office, Department of the Army. This is a written test containing 183 multiple-choice items based on subject matter taught in Army basic combat training. A biographical information questionnaire was also administered to secure information on 20 personal history and Army service variables whose relationship to BMPT scores may be important, e.g., time since separation from extended active duty, type of Army basic training, etc. Army classification test scores were obtained from personnel

records in so far as possible. The bulk of the data was collected during the 1954 active duty training period of six United States Army Reserve Divisions.

RESULTS: Analyses of variance of BMPT scores by aptitude groups as a function of time since separation from active duty yielded *F* ratios significant beyond the one per cent level of confidence. However, the great majority of differences among BMPT means for the various time groups within aptitude levels were small. The data also support the conclusion that the level of retention of basic military skills does not materially change with time (up to six years) from what it was at the end of active duty.

4:35. Factors affecting the level of basic military knowledge of active Army enlisted personnel at various points during Army service. A. I. PRINCE, W. E. MONTAGUE, I. H. SCHEIER, AND G. J. WISCHNER, *Human Resources Research Office, The George Washington University.*

PROBLEM: (a) To determine the level of basic military knowledge prior to basic training and at various stages following the completion of this training; (b) to relate the level of such knowledge to various factors.

SUBJECTS: 6,066 Army enlisted personnel.

PROCEDURE: Level of basic military knowledge was measured by the Basic Military Proficiency Test (BMPT) developed by the Personnel Research Branch of the Adjutant General's Office. This is a 183-item multiple-choice test covering the first eight weeks of basic combat training. Army Aptitude Area I scores, a part of the Army Classification Battery, were obtained for each man. Using a cross-sectional approach, the test was administered to groups at the following stages: (a) before basic training (0 weeks), (b) after basic training (8 weeks), (c) after basic and advanced infantry training (16 weeks), (d) after assignment to Army units. Three subgroups of soldiers comprised Group 4: Infantry (e.g., rifleman), infantry-associated (e.g., artilleryman), noninfantry (e.g., clerks). These three subgroups receive different amounts of refresher training and experience on the material covered by the BMPT, the Infantry subgroup receiving the most, and the noninfantry subgroup the least. These subgroups were further divided in terms of elapsed time (in months) since the completion of basic training.

RESULTS:

1. Eight weeks of Basic Training resulted in a forty per cent increase in BMPT performance. An additional eight weeks of advanced infantry training resulted in only a very small increase in test performance scores.

2. Amount of retraining and length of service were

negatively related to aptitude but positively related to BMPT performance.

3. There was a high positive correlation between aptitude and BMPT performance.

The combined effects of 2 and 3 above upon the comparative performance of the infantry, the infantry-associated, and noninfantry groups will be considered. Slides.

Division 3. Comparative

5:00-6:00. Room 2127, Sheraton Palace
HARRY W. BRAUN, Chairman

5:00. The performance of cats on the double alternation problem. CHARLES N. STEWART AND J. M. WARREN, *University of Oregon.* (Sponsor, J. M. Warren)

The purpose of this experiment was to determine the limits of the cats' ability to solve the double alternation problem.

SUBJECTS: Eight experimentally sophisticated cats who had previously had six months training on a series of discrimination learning problems.

PROCEDURE: The subjects were tested in the Wisconsin General Test Apparatus.

A. Identical stimuli were presented to the animal on the test tray and the cat was required to respond twice on one side and twice on the other. A series of four such presentations, tested with minimal intertrial delay constituted a sequence. A constant delay of 30 seconds intervened between successive sequences and the cats were tested on 10 such sequences per day for 30 days or until they had reached the criterion of 80 per cent correct responses over a five-day period.

B. After the subjects reached criterion on the four-response sequence, they were tested on a series of 8-response sequences. Again there was a minimal delay between successive responses within a sequence and a constant 30-second delay between sequences. The cats were tested on six eight-response sequences each day for 15 days.

RESULTS:

A. Six of the cats studied reached the criterion of 80 per cent correct responses over a five-day period within 30 days. The remaining two cats reached the criterion in 45 days.

B. The subjects manifested no significant improvement in performance over 15 days testing on the eight-response series. Most of the cats failed to shift their response after the first alternation, i.e., they responded twice on one side followed by six times to the other side, e.g., RRLLLLL. One cat, however, succeeded in extending the series, attaining a level of performance on all trials which was significantly better than chance. This animal made eight out of eight correct responses on 30 per cent of the sequence.

CONCLUSIONS: The results of this experiment indicate:

1. That cats can learn the double alternation problem with approximately the same facility when a manipulatory response is required as when they are tested in the temporal maze (cf. earlier reports by Karn).

2. The results support the view that subprimate mammals are unable to extend the double alternation principle beyond a set of four responses. However, the partial success attained by one subject suggests that a quantitative rather than a qualitative difference is involved.

Slides.

5:15. Learning in two marine annelids. WALTER COPPOCK AND M. E. BITTERMAN, *University of California, Berkeley*.

Instances of stable behavioral modification have been observed in worms, but there has been no systematic investigation of these phenomena on the basis of which their relation to the widely explored processes of mammalian learning might be analyzed. This paper describes the results of preliminary studies of two polychaetes, *Nereis vexillosa* and *Mercierella enigmatica*, which are readily maintained under laboratory conditions and whose behavioral properties are well suited to the study of modifiability in situations directly analogous to those which are commonly employed at the mammalian level. *Nereis*, which Cope-land investigated 25 years ago, is a voracious animal which approaches the mouth of a glass tube in which it lives when a bit of clam is deposited there. If light is paired with food, light alone soon comes to evoke the approach response, and this tendency extinguishes gradually in the course of nonreinforced trials. *Mercierella*, closely related to a species studied by A. W. Yerkes in 1906, withdraws sharply, in an all-or-none fashion, into its calcareous tube in response to a variety of stimuli such as decrement in illumination ("shadow response"), electric shocks, vibration, and the like. With brief shock as the US, withdrawal can be conditioned to an increment in illumination, a stimulus which does not elicit that response prior to training, and the optimal CS-US interval seems to differ markedly from that found in mammals. The response is extinguished by nonreinforcement. Problems involved in the control of motivation and in the standardization of experimental conditions for both species are discussed.

Slides.

5:30. Directional differences in pigeon homing. J. G. PRATT, *Duke University*, AND GUSTAV KRAMER, *Max-Planck Institut, Wilhelmshaven*.

A definite superiority of pigeons homing from north to south as compared with pigeons homing from east to west was first observed in Wilhelmshaven, Germany. Owing to restrictions imposed by landscape features, this phenomenon was not followed up more closely in Germany. Further work was done in the Carolinas, U. S. A. Two different lofts in the Durham, North Carolina region gave the following results: Even at close distances (16-17½ miles) the homing performances are rarely homogeneous in simultaneous releases from the four main directions, even if the same experimental pattern is repeated for eight times. In the over-all appraisal, south to north homing is best, north to south homing the poorest. However, there are strong suggestions to indicate that differences from time to time are significant.

At longer distances (50-60 miles) the north superiority is even more marked. It was clear also with these birds which had had the eight previous 17-mile releases.

Differences in homing success as related to the release direction were also observed in a pigeon stock at Mountville, South Carolina.

It is not clear whether directional differences are regular features in all regions and/or in all pigeon stocks. They are not reported by Matthews at Cambridge, England. Further comparisons are required.

The significance of the observed facts is not clear, but it is suggested that from a comparative study of directional differences in various regions for the investigation of the orientation mechanism, clues may be available. So far the existence of those differences even at close distances tends to show that the orientation method is not likely to be based simply upon recognition of landmarks.

Slides.

5:45. Underwater noises made by animals of the sea. W. N. KELLOGG, *Florida State University*.

This report describes the methods and results of a five-year research program devoted to the collection and analysis of sounds made in ocean waters by mollusca, crustacea, fishes, and small whales. The underwater acoustical equipment and some of the electronic accessories were loaned by the United States Navy on ONR contact.

Many of the observations were obtained at or near the Oceanographic Institute of Florida State University on the Gulf of Mexico. Others were made in the Atlantic Ocean and in waters of the British West Indies. The recordings of sounds produced by wild or free-swimming specimens were obtained from skiffs, motor boats, and a Navy plane personnel boat. Observations were also made from a large Coast Guard steamer in the open Gulf as far south as the

Yucatan Peninsula. A number of the recordings were taken from captive specimens in salt-water tanks or aquaria.

Generally speaking, the noises emitted by organisms of the sea are best described by such terms as clicks, croaks, grunts, rattles, thumps, or whistles. The ocean can no longer be thought of as a "silent" or a "quiet" place. In some cases the underwater crepitation made by large numbers of crustaceans or fishes is so great as to produce a positive din—like static in a radio. It can seriously interfere with Navy sonar, and with the listening for submerged ship and propeller sounds which is a regular part of our Navy defense system. None of the organisms producing these noises possesses any vocal cords.

Representative or typical underwater sounds will be discussed and the methods thus far used in their acoustical analysis described. The possible biological significance of these sounds will also be examined.

Slides.

Division 19. Behavior under Hardship Conditions

5:00-6:00. Empire Room, Sir Francis Drake

RICHARD P. YOUTZ, Chairman

5:00. Personality requirements for survival. E. PAUL

TORRANCE, ROBERT C. ZILLER, AND MARIO LEVI,
Survival Research Field Unit, Crew Research Laboratory, AFPTRC, Stead Air Force Base, Reno, Nevada.

PROBLEM: The purpose of this paper is to synthesize a series of seven substudies designed to determine the personality requirements for survival, how survivors adapt to meet these requirements, and how aircrews can be more effectively trained to meet requirements.

PROCEDURE: The first substudy consisted of personality studies from interview reports of 200 Air Force survivors, using Q technique and analysis of survival-behavior episodes. The second consisted of intensive case studies of six Korean evadée-survivors. Data consisted of official interview reports, focused psychological interviews, two Q sorts (usual and survival behavior), biographical inventories, and Rorschachs, integrated by intercorrelations of Q sorts. The other five substudies (N 's = 60 to 800) used biographical inventories constructed according to rationales concerning survival requirements. All criteria were intermediate ones developed in USAF advanced survival training. Two employed self-confidence in ability to survive, sociometric ratings on survival criteria, and instructor ratings. Others involved operational measures of behavior important in survival: frustration reactions, "will-to-survive," and willingness to take calculated risks.

RESULTS: Interview reports lend themselves to the study of personality requirements for survival almost

as well as intensive case data. Twelve personality requirements were identified. Important differences exist between actual survival behavior and the "ideal survival personality" as described by ten survival experts. Personality patterns were developed from the biographical inventories for individuals adapting successfully according to each criteria.

CONCLUSIONS: One's chances of survival may depend more upon his personality than upon the danger. If he recognizes the requirements of the situation and what tendencies he has that endanger chances of survival, he can adapt his behavior accordingly. Survival training should implement the concept embodied in this conclusion.

5:15. Sensory functions and motor performance during maintenance on survival rations. JOSEF BROŽEK, EDWIN A. FLEISHMAN, SHELBY HARRIS, FRANK M. LASSMAN, AND JOSÉ H. VIDAL,
School of Public Health, University of Minnesota.

PROBLEM: In a variety of emergency situations individuals, primarily military personnel, have to subsist on severely restricted diets. The present report deals with one facet of comprehensive studies on the optimal size and composition of survival rations.

SUBJECTS AND CONDITIONS: 13 young men, volunteers recruited from the Quartermaster Corps pool of test subjects, were studied during 21 days of control period (C; good mixed diet of 3,280 cal./day), 24 days of restricted diet (S; 1010 cal./day of carbohydrate only), and 21 days of refeeding (R; mixed diet of 5,300 cal./day). Physical activity was moderate in intensity and was kept constant throughout. Mean body weights at the end of C, S, and R were 69.05 kg., 61.55 kg. ($\Delta = 7.50$ kg. or 16.5 lbs.) and 66.63 kg.

RESULTS: Tests of sensory functions included vision (vergences, accommodation, visual recognition, glare tests) and hearing (audiograms, speech perception). Strength was determined by a hand-grip dynamometer. Speed of ballistic leg movements, finger dexterity, hand steadiness and leg balance were measured. The motions involved in turning knobs, under "comfortable" and maximal pace, were analyzed for manipulation and travel time. While acute starvation (no calories) results in rapid and marked deterioration in several aspects of motor fitness (cf. *American Psychologist* 9, 342, 1954), intake of 1,000 cal. a day for 24 days was associated with only small or no deterioration in motor functions, vision, and hearing. Slides.

5:30. Motion sickness—A tri-service study of a tri-service problem. RICHARD TRUMBULL, *Office of Naval Research.*

During the Fall of 1954, a tri-service committee was established to design and implement a program bringing order to one of the most complex areas of service research—motion sickness. Common to all services, in one form or another, this problem had been investigated by civilian and service laboratories for over 10 years. A request from the Joint Services Medical Procurement Agency for a recommendation of the best drug to be purchased in quantity to meet the needs of the services precipitated a thorough analysis of these studies and realization that no answer was available.

The Tri-Service Motion Sickness Committee initiated a comprehensive study to evaluate drug effectiveness and influence upon performance throughout the service situations demanding such protection. Phase I was designed to evaluate the largest number of promising drugs on troop transports in the North Atlantic during the past winter months. Over 20 crossings were used in screening more than two dozen drugs. As relative ineffectiveness was empirically established, individual drugs were eliminated from the study until the final five were obtained with samples of over 1,200 men.

The five remaining drugs will provide the basis for projected studies in air transport, small landing craft, paratroop and other situations where large samples are impossible.

A summary of Phase I will be given with the broader program envisaged for the completion of the entire tri-service survey.

5:45. **Monotony in food acceptance.** FRANCIS J. PILGRIM AND HOWARD G. SCHUTZ, *Quartermaster Food and Container Institute, Chicago.*

PROBLEM: To determine the effect of repetitive eating of a limited number of food items on preference ratings and rejection of items; to assess those food characteristics and personality characteristics that interact to produce the phenomenon ordinarily called "monotony."

PROCEDURE: 80 Army men participating in a nutrition study at high activity level in the cold were maintained on a fixed diet of four daily menus for six weeks. All food consumptions were measured. The subjects rated the foods on a preference scale during the second and sixth week, and 24 subjects were interviewed after the second rating session.

RESULTS: Preferences for foods as expressed on a rating scale are highly correlated with percentage rejection of the 41 foods employed in this study. With repetitive consumption, some foods rose in preference, some remained unchanged, and others declined. Correlation between initial rating and change in rating is significant although not large. Type of food, however, is important: most meats (canned) declined significantly; dry cereals rose in preference; two-thirds of the canned vegetables declined; fruits, desserts, and staples showed little change. Changes in preference from first to second rating session showed little relationship to several physical and psychological variables but were related to body weight.

Slides.

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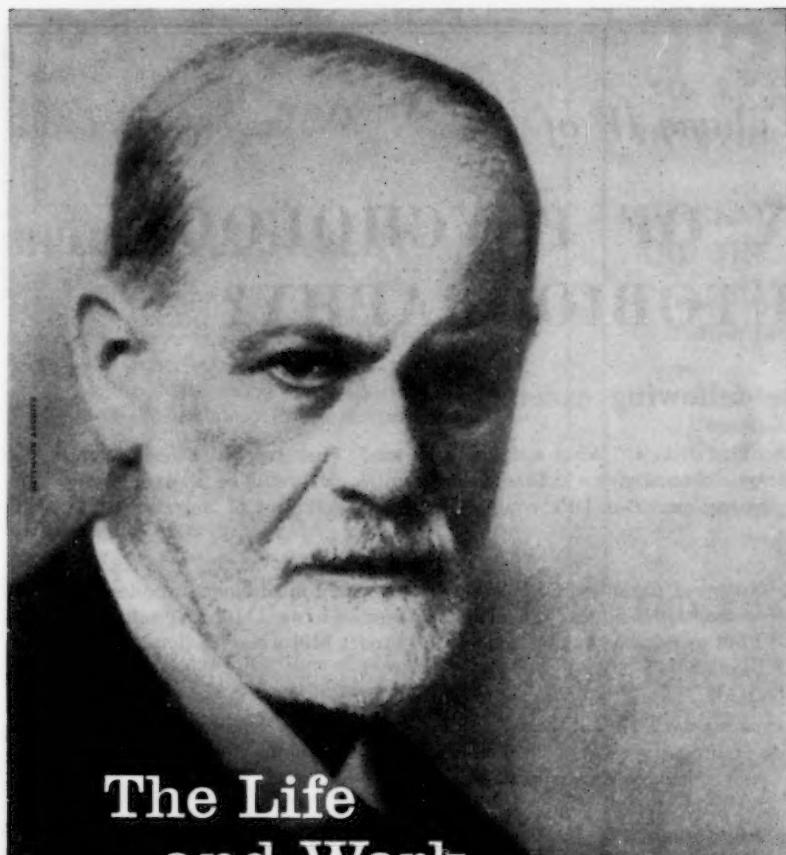
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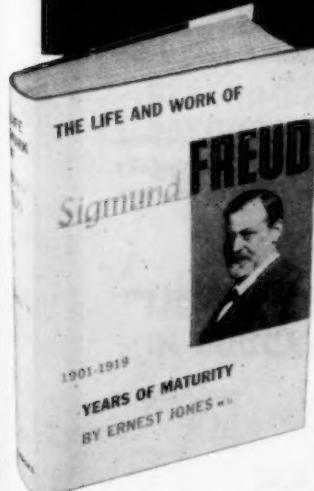
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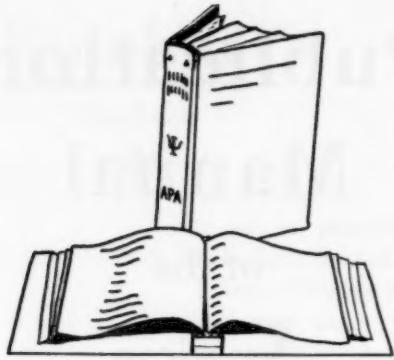
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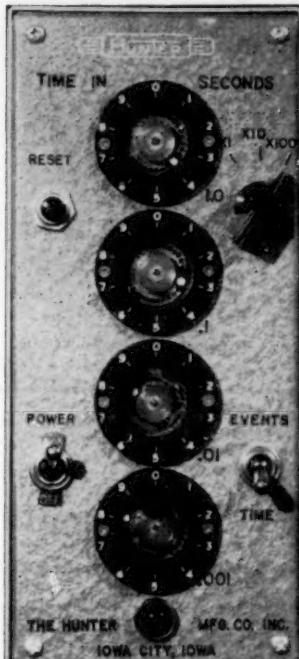
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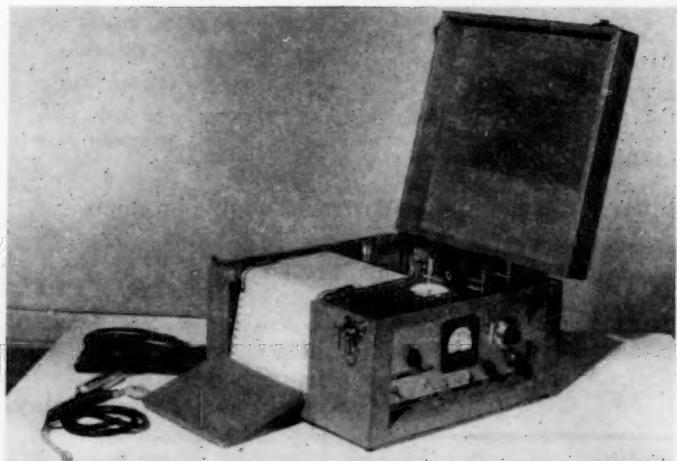
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